
Public Policy Impact

Utilization of Home Health Services before and after the Balanced Budget Act of 1997: What Were the Initial Effects?

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Objective. To estimate the impact of the Balanced Budget Act of 1997 (BBA), which changed the way Medicare reimbursed for home health services, on a range of home health utilization measures, and to examine whether particular subgroups of beneficiaries were differentially impacted in the post-BBA period.

Data Sources. Secondary data from the Centers for Medicare and Medicaid Services (CMS) Standard Analytic Files for the 1 percent sample of Medicare beneficiaries for fiscal years 1997 and 1999, linked with information from CMS eligibility, provider, and cost report files as well as the Area Resources File.

Study Design. Logistic regression was used to estimate the effects of being in the post-BBA period on the incidence of home health service use and ordinary least squares (OLS) regression was used to estimate the effects of being in the post-BBA period on the amount and type of use by home health service users. Interaction terms were included for all the independent variables to assess whether the effect was disproportionate among particular beneficiary subgroups.

Principal Findings. Results show a 22 percent decrease in the percentage using home health services post-BBA and a 39 percent decrease in the number of visits per user. Stronger reductions, though not very large, were found in the incidence of use for beneficiaries aged 85 and older, those in states with high historical Medicare home health use, and those with Medicaid buy-in. More intensive reductions in the number of services were found for those aged 85 and older, in high historical Medicare use states, nonwhites, females, those using for-profit agencies, and those treated for certain diagnoses. Less intensive reductions were associated with hospital-based agencies.

Conclusions. This research demonstrates that public program expenditures can be sharply curtailed with financial incentives. As reimbursement shifts to a prospective payment system legislated by the BBA, utilization should be closely monitored, especially for vulnerable subgroups.

Key Words. Home health care, health services utilization, Medicare

The utilization of home health care services under Medicare has undergone dramatic decreases in the last four years, as Congress, the Centers for

Medicare and Medicaid Services (CMS, formerly the Health Care Financing Administration), and other government agencies have made concerted efforts to reform the way home health care under Medicare is delivered and paid for. These efforts have involved both administrative and legislative activities, including the Balanced Budget Act of 1997 (BBA).

During the early part of the last decade, the use of Medicare home health care services rose dramatically, more than 30 percent per year from 1988 to 1996 (Medicare Payment Advisory Commission 1999a). The CMS, the Office of Inspector General (OIG), and the Administration on Aging all voiced concerns about the appropriateness of these increases. In 1995, the three agencies jointly implemented Operation Restore Trust (ORT), an effort to identify fraud and abuse in home health agencies, nursing homes, and medical equipment suppliers.

In addition to authorizing grants to expand ORT, the Health Insurance Portability and Accountability Act of 1996 imposed civil monetary penalties on physicians who knowingly certified patients for Medicare home health who did not meet the eligibility requirements. Beginning in September 1996, intravenous antibiotic administration for home care patients was discontinued as a covered service. The CMS took the further step in September 1997 of implementing a six-month moratorium on the certification of new home health agencies and increasing cost report audits and medical reviews of claims. In February 1998, the need for venipuncture no longer qualified a patient for home care.

While these measures focused on compliance initiatives within the home health industry, there was also a belief that much of the problem of the increasing expenditures rested with the relatively open-ended reimbursement system. The BBA addressed this issue by legislating the implementation of a prospective payment system (PPS) to reimburse home health agencies, and clarified some definitions relating to home health eligibility and coverage.

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Further, the legislation mandated the use of an interim payment system (IPS) to limit costs while the PPS was being developed.

The IPS was phased in beginning in October 1997 with the start of each agency's cost reporting period. Under IPS, agency reimbursement was constrained by both an aggregate per-visit cost limitation and by an aggregate per-beneficiary cost limit. Because of these limits, many analysts expressed concern that access to home care could be endangered, especially to those beneficiaries needing the most care (U. S. General Accounting Office 1998; Komisar and Feder 1998; Smith, Rosenbaum, and Schwartz 1998; Lewin Group 1998; Gage 1999; Medicare Payment Advisory Commission 1999a).

Since the passage of the BBA, the General Accounting Office, the Department of Health and Human Services Office of the Inspector General, the Medicare Payment Advisory Commission, and George Washington University have conducted studies of Medicare home health agencies and Medicare beneficiaries. These studies have demonstrated that substantial numbers of home care agencies have closed (U. S. General Accounting Office 1999), beneficiary utilization has fallen (U. S. General Accounting Office 2000), and the marketplace has changed dramatically (Medicare Payment Advisory Commission 1999b). However, they have had differing conclusions regarding whether beneficiary access to care has been affected (Office of the Inspector General 1999, 2000a, 2000b; Smith, Maloy, and Hawkins 1999, 2000).

Descriptive analysis of CMS claims and eligibility data from calendar years 1996 through 1999 indicates a precipitous decline in utilization of Medicare home health care beginning in the fourth quarter of 1997, when the implementation of the IPS began. The rate of users per 1,000 Medicare beneficiaries dropped to 92 in fiscal year (FY) 1998 from a rate of 101 in FY 1997. The rate declined further to 80 users per 1,000 Medicare beneficiaries in FY 1998. The number of visits per user also dropped from 79 in FY 1997 to 62 in FY 1998 and then to 46 in FY 1999 (McCall et al. 2001).

This paper focuses on an analysis of the use of home health services in FY 1997, which was the year before the IPS began being phased-in, and FY 1999, which was the first year after which the IPS was fully phased in. It is a multivariate analysis of the incidence of use and the amount of use among users, with a focus on whether particular subgroups of beneficiaries were differentially impacted in the post-BBA period.

METHODOLOGY

Data

Data used in this study are from the CMS Standard Analytic Files for the 1 percent sample of fee-for-service Medicare beneficiaries linked with information from CMS eligibility files, CMS Provider of Services and Cost Report files, the Area Resource File (ARF), and specially collected information on state Medicare and Medicaid home health utilization experience. The study population includes beneficiaries with Part A coverage who are not enrolled in a managed care plan and who reside in one of the fifty states or the District of Columbia. Data on utilization were aggregated for individuals in FY 1997, and FY 1999.

In each year, individuals are categorized as either home health users or home health nonusers. Home health users are defined as individuals who received a Part A or Part B home health visit from any of the six home health disciplines: skilled nursing, physical therapy, occupational therapy, speech language pathology, medical social services, and home health aide. Users do not include individuals who received only equipment or supplies under the home health benefit. The study group includes both full- and partial-year beneficiaries. Data for these partial-year beneficiaries are weighted by the proportion of the year they were eligible.

Utilization measures examined are the number of visits, number of relative value units (RVUs), and number of visits by discipline. The number of visits is the total number of units of services recorded in home health claims for any of the six disciplines. The number of relative value units is a measure of relative service intensity. It weights the number of visits of each discipline type by a measure of its relative value based on the national median per-visit cost for each discipline (with skilled nursing = 1).¹

Analytical Approach

This study looks at the utilization of Medicare home health services before and after the full implementation of the IPS as part of the BBA of 1997. The immediate main effect of the BBA was the implementation of an interim payment system; however, the utilization effects observed are also reflective of the compliance initiatives put in place by several federal agencies, first begun in mid-1995.

Model Employed. The use of Medicare home health is seen as two-phased. Beneficiaries must first gain entry into Medicare home health care. Once a beneficiary is accepted for care by an agency, a plan of treatment is

developed and authorized by a physician. The analysis is thus divided into two parts. The first part examines the incidence of use using logistic regression. The 1 percent sample of all Medicare beneficiaries is used to estimate the overall effects of being in the post-BBA period controlling for demographic characteristics (age, gender, race, Medicaid buy-in status, original reason for Medicare entitlement); prior use of Medicare Part A services (number of inpatient days and number of skilled nursing facility [SNF] days six months prior to fiscal year); and community characteristics, including general information (urbanization, census region, Medicare managed care penetration), supply of home health resources and substitutes for home health care (hospital occupancy, nursing home bed availability, home health employees), and state historical Medicare and Medicaid health care and home health use. Of special interest is whether the effect post-BBA is disproportionate among particular subgroups of beneficiaries as defined by their characteristics or the characteristics of their communities. Thus, the model includes interaction terms for all the independent variables.

The second part of the analysis focuses on users of home health services. It examines the effect of being in the post-BBA period on the amount and type of use using ordinary least squares (OLS) regression models. Control variables include the demographic, prior medical care utilization, and community variables employed in the first part of the analysis, plus characteristics of the agency providing the home health care services (profit status, age, size, affiliation) and the predominant primary and secondary diagnoses for which home care was provided. As in the analysis of the incidence of use, the model includes interaction terms for all the independent variables.²

Selection of Subgroups. While the goal of the BBA was to provide more appropriate care, there was concern that its incentives translated most directly to changing home health agencies' behavior toward Medicare beneficiaries needing the most care. As a reaction to the BBA's financial incentives, agencies could change their practices by reducing the number of visits and shifting the mix of visits, as well as by avoiding certain high treatment cases altogether. Certain subgroups of Medicare beneficiaries were hypothesized to be differentially affected by the policy changes, either because they were associated with higher levels of home health care use prior to the BBA or because of the characteristics of the agencies who provided their care, and these subgroups were selected for more in-depth analysis.

Several studies have highlighted four specific demographic subgroups, namely, the *oldest old*, *females*, *nonwhites*, and those with *Medicaid buy-in* as representing particularly frail and vulnerable individuals who might be

adversely affected by the IPS and other BBA reforms (Komisar and Feder 1998; Smith, Rosenbaum, and Schwartz 1998; Lewin Group 1998). Beneficiaries who reside in *states that have had historically relatively high Medicare home health care use*, were found by the GAO (2000) to have experienced disproportionate utilization reductions after BBA implementation. *For-profit agencies* were generally associated with providing a larger number of visits per case in the pre-BBA period than other ownership categories (U. S. General Accounting Office 2000; Lewin Group 1998; Franco and Leon 2000; Goldberg and Schmitz 1994; Leon, Neuman, and Parente 1997) and could be thought to respond more quickly to the effect on their bottom lines brought on by the policy changes. *Hospital-based agencies* were more likely to have postacute rather than chronic care patients, and thus less discretionary home health care use (Leon, Neuman, and Parente 1997; Lewin Group 1998), and may be better able to sustain losses because of their access to additional financial resources (Franco and Leon 2000). Also examined are six diagnoses-defined subgroups (*diabetes, hypertensive disease, heart failure, cerebrovascular disease, chronic airway obstruction, and skin ulcers*), which were among the highest users pre-BBA (McCall et al. 2001) and/or were highlighted in interviews with home health agencies and discharge planners as diagnoses subject to admission avoidance or utilization reductions post-BBA (Smith, Maloy, and Hawkins 2000, 1999).

RESULTS

Characteristics of the Study Population

Table 1 shows selected characteristics of the 1 percent sample of Medicare beneficiaries in 1997 and 1999 divided by each year into two groups: users of home health services and nonusers of home health services. Data reported are weighted person-years. Because of the large sample sizes, small differences may be statistically significant.

The users and nonusers in both years were significantly different populations with regard to many of the characteristics examined. The users include more of the vulnerable population groups—older beneficiaries, females, nonwhites, and those who are also eligible for Medicaid. They have a sicker profile as measured by their prior medical care use.³ They also differ on some community characteristics.

The users in both years are similar populations with respect to the characteristics in the table. Of those differences that were significant, many of

Table 1: Characteristics of Medicare Home Health Users and Nonusers, Pre- and Post-BBA, Fiscal Years 1997 and 1999

	1997		1999	
	Users	Nonusers	Users	Nonusers
Number of Person-Years	32,955	293,023	25,182	289,547
Demographic (%)				
Age				
Younger than 65	7.80	13.64**	8.46 ^{††}	14.68**
65-74	26.02	46.34**	25.12 [†]	43.68**
75-84	40.78	30.00**	40.32	30.73**
85 and Older	25.41	10.02**	26.10	10.90**
Female	65.27	56.25**	64.96	56.25**
Nonwhite	14.98	12.92**	15.17	13.75**
State Medicaid buy-in	22.41	13.96**	22.91	15.44**
Original Medicare entitlement disabled or ESRD	18.28	19.36**	19.18 ^{††}	20.60**
Prior Medicare Use				
Inpatient days 6 months prior to FY	3.11	0.59**	3.35 ^{††}	0.62**
SNF days 6 months prior to FY	1.38	0.37**	1.55 [†]	0.3**
Community				
General				
Urban (%)	72.17	72.93**	72.91 [†]	71.61**
Census Region (%)				
New England	7.36	5.56**	7.29	5.17**
Middle Atlantic	14.72	15.44**	16.61 ^{††}	14.69**
South Atlantic	19.83	19.79	20.47	20.14
East North Central	16.40	18.52**	16.24	18.39**
East South Central	9.19	7.17**	8.20 ^{††}	7.55**
West North Central	6.65	8.24**	6.58	8.38**
West South Central	12.65	10.04**	11.19 ^{††}	10.16**
Mountain	4.09	5.05**	4.06	5.13**
Pacific	9.12	10.18**	9.36	10.38**
Medicare managed care penetration (%)	13.32	13.09**	13.27	12.69**
Supply of resources in county pre-BBA				
Hospital occupancy rate (%)	59.65	59.85**	60.17 ^{††}	59.66**
Nursing home beds per 100 persons > 65	5.83	5.79*	5.71 ^{††}	5.79*
Medicare HHA employees per person > 65	1.26	1.13**	1.24	1.13*
Historical medical use				
County Pt. A/ B reimbursement per beneficiary (1000s)	3.30	3.23**	3.30	3.21**

continued

Table 1: Continued

	1997		1999	
	Users	Nonusers	Users	Nonusers
Community continued				
State Medicare home health visits per beneficiary	7.71	6.95**	7.41 ^{††}	6.97**
State Medicaid waiver expenditures per capita	5.25	5.54**	5.18	5.58**
Partial Year Participation (%)				
Died in fiscal year	8.60	1.98**	9.25 ^{††}	2.13**
Other part year eligibility	2.00	5.69**	1.82	4.96**

Sources: CMS Denominator and Standard Analytic Files, and Area Resource File.

*Users significantly different from nonusers at $p \leq .05$, two-tailed test.

**Users significantly different from nonusers at $p \leq .01$, two-tailed test.

[†]1999 users significantly different from 1997 users at $p \leq .05$, two-tailed test.

^{††}1999 users significantly different from 1997 users at $p \leq .01$, two-tailed test.

them were small. Post-BBA, the users include more disabled beneficiaries and more beneficiaries with prior hospital care.

Table 2 shows the distribution between the users pre- and post-BBA by agency characteristics and primary and secondary diagnoses. In the post-BBA period, a smaller percentage of beneficiaries were seen by for-profit agencies and larger agencies (i.e., those with more than 30,000 Medicare visits per year). Hospital-based agencies and new agencies saw a larger percentage of users.⁴ The diagnoses distribution for which beneficiaries received home health also shifted between the two periods, with a decrease in diagnoses representing chronic care and increases in acute care and conditions requiring rehabilitative care.

Differences in Utilization

Data reported in Table 3 are the differences in utilization rates regression adjusted to control for differences between the 1997 and 1999 populations on the characteristics shown in Tables 1 and 2. The regression-adjusted difference in the percentage of beneficiaries using home health services was calculated from a logistic regression that includes an independent variable for the post-BBA period, and control variables for beneficiary demographic characteristics, prior use, community characteristics, and each of these variables interacted with the POST BBA variable. Using the intercept and coefficients from the model, the difference in the percentage using home health care

Table 2: Percentage of Medicare Home Health Users with Selected Agency and Diagnostic Characteristics, Pre- and Post-BBA, Fiscal Years 1997 and 1999

	1997	1999
Number of Person-Years	32,955	25,182
Agency Characteristics		
Agency for-profit	37.74	33.01**
Agency hospital-based	37.52	40.26**
New agency (date of participation after Oct. 1993)	13.42	15.49**
Agency > 30,000 visits	66.84	65.20**
Primary or Secondary Diagnoses		
Diabetes	13.46	11.95**
Hypertensive disease	16.51	13.61**
Heart failure	10.86	9.86**
Cardiac dysrhythmias	4.90	4.40**
Chronic ischemic heart disease	5.33	5.27
Cerebrovascular disease	8.87	7.84**
Osteoarthritis and related disorders	7.35	7.88*
Chronic airway obstruction	5.69	5.15**
Skin ulcers	3.24	4.14**
Fractured femur	3.30	3.53
Cancer	5.73	5.90
Burn and trauma or nonhealing surgical wounds	4.09	5.07**
Urinary or bowel incontinence	1.45	1.30
Selected neurological diagnoses	5.36	5.23
Selected orthopedic diagnoses	12.12	13.86**

Sources: CMS Denominator, Home Health Standard Analytic Files, Provider of Services and Cost Report files.

*Significantly different from 1997 at $p \leq .05$, two-tailed test.

**Significantly different from 1997 at $p \leq .01$, two-tailed test.

(row 1, column 1) was estimated by calculating predicted probabilities for all sample members first as if they were in the pre-BBA period (POST BBA = 0), and then as if they were in the post-BBA period (POST BBA = 1). The mean of the difference between these two predicted probabilities across the sample members was the difference in the post-BBA period holding constant all the control variables in the model.

The regression-adjusted differences in the number of home health visits and RVUs received (rows 2 through 9, column 1) were estimated from OLS regressions that control for all the independent variables in the percentage of beneficiaries using home health services analysis plus characteristics of the agency providing the services, the diagnoses for which home health care was being received, and all the independent variables

Table 3: Regression-Adjusted Differences between the Pre- and Post-BBA Period in Home Health Utilization

	<i>Estimated Difference*</i>	<i>P-value</i>	<i>1997</i>	<i>Estimated Difference as % of 1997</i>
Percentage Using Home Health Services	- 2.22	<.0001	10.08	- 22
Number of Home Health Visits				
Per home health user	- 30.78	<.0001	78.84	- 39
By visit type				
Skilled nursing	- 9.30	<.0001	32.19	- 29
Physical therapy	- 0.41	<.0001	6.00	- 7
Occupational therapy	- 0.08	<.0001	0.41	- 20
Speech language pathology	0.06	<.0001	1.04	6
Medical social services	- 0.32	<.0001	0.82	- 38
Home health aide	- 20.73	<.0001	38.39	- 54
Number of Home Health RVUs				
Per home health user	- 19.58	<.0001	59.18	- 33

Sources: CMS Denominator, Standard Analytic Files, Provider of Services, Cost Report and Area Resource Files.

*Regression adjusted to control for differences between the time periods. Logit regression adjustment for the probability of home health use controls for beneficiary demographic, prior use, community characteristics, and all the independent variables interacted with POST BBA. The OLS regression adjustment of number of visits and RVUs controls for beneficiary demographic, prior use, community, characteristics of the agency where the home care was received, diagnoses for which home care was being received, and all the independent variables interacted with POST BBA. The *p*-value of the estimated difference is the *p*-value of the coefficient of POST BBA.

interacted with the POST BBA variable. The estimated differences in the measures of amount of use among users were calculated in the same manner as described in the paragraph above but using the parameters from the OLS regressions.

Table 3 also shows the probability that the estimated difference is significant, the mean utilization in 1997, and the estimated difference as a percentage of the pre-BBA mean. The mean pre-BBA utilization is included to give perspective to the relative magnitude of the estimated difference.

The percentage of users was reduced by a little more than one-fifth from a rate of 10 percent in the pre-BBA period. The number of visits among users decreased by approximately two-fifths, from a pre-BBA rate per home health users of 78.8 visits. The number of RVUs decreased by less than the number of visits, 33 percent as compared to 39 percent, indicating a disproportionate reduction of less intensive services. Aide visits decreased the

Table 4: Estimated Difference for Selected Subgroups in the Probability of Home Health Use Post-BBA and Whether They Experienced a Differential Impact Post-BBA

	<i>Estimated Difference* (p-value)</i>	<i>1997</i>	<i>Estimated Difference as % of 1997</i>	<i>Differential Impact? (direction)</i>
Sample average	-2.22 ($p < .01$)	10.08	-22	
85 and older	-5.12 ($p < .01$)	22.19	-23	Yes (-)
Female	-2.57 ($p < .01$)	11.54	-22	No
Nonwhite	-2.75 ($p < .01$)	11.51	-24	No
Buy-in	-3.75 ($p < .01$)	15.30	-25	Yes (-)
High Medicare home health states	-3.20 ($p < .01$)	12.06	-27	Yes (-)

Sources: CMS Denominator, Standard Analytic Files, Provider of Services, Cost Report and Area Resource Files.

*The difference was estimated from the parameters of the logistic regression. The logit model controls for beneficiary demographic, prior use, community characteristics, and all the independent variables interacted with POST BBA. Predicted probabilities were estimated for the selected subgroup members first as if they were in the pre-BBA period and then as if they were in the post-BBA period. The mean of the difference between these two predicted probabilities across the sample members is the estimated difference. The p -value of the estimated difference is the p -value of the coefficient of POST BBA.

most (54 percent), followed by medical social services (38 percent), skilled nursing (29 percent), occupational therapy (20 percent), and physical therapy visits (7 percent). The rate for speech language pathology visits actually increased (6 percent).

Subgroups with Differential Impacts

Incidence of Home Health Use. Table 4 shows the regression-adjusted differences in use for the selected subgroups post-BBA. If the interaction term of the variable identifying the subgroup of interest and the POST BBA variable in the logistic regression is significant, then the subgroup is differentially impacted post-BBA. This interaction term measures the independent effect, over and above the effect of the variables themselves, of being both a member of the group identified by the variable of interest and of being in the post-BBA period. A negative significant interaction term indicates that the additional effect of being in the subgroup of interest along with being in the post-BBA period reduces the probability of using home health services controlling for all the other independent variables in the model.

In general, while three of the five subgroups shown in Table 4 saw significant differential effects, these effects were relatively small on an absolute

basis and often not very different from the average decrease on a relative basis. This is demonstrated by examining the absolute decreases in column 1 and comparing the relative decreases in column 3 with the average decrease overall. The largest absolute effect found was 5 percentage points (see column 1) for beneficiaries 85 years of age and older. Since the pre-BBA percentage having a home health visit was high, 22.2 percent, the relative decrease was 23 percent; only one percent more than the average decrease of 22 percent.

Beneficiaries having Medicaid buy-in and those in high historical Medicare home health states also experienced significant differential reductions in the incidence of use of home health services. Buy-in beneficiaries had a moderately high pre-BBA percentage using home health services, 15.3 percent, and an estimated 3.8 percentage points decrease post-BBA; a relative decrease of 25 percent. The reduction on a relative basis was larger for those in the high historical Medicare home health use states, although their percentage using home health in the base period was smaller. Beneficiaries in high historical Medicare home health use states had a 27 percent relative decrease in the probability of use; 3.2 percentage points from a pre-BBA level of 12.1 percent. The other two selected groups—females and nonwhites—were not differentially impacted post-BBA. Among the five groups studied, these groups had the lowest percentage using home health in the pre-BBA period; both had a rate of use of 11.5 percent.

Amount of Home Health Use Among Users. The subgroups selected for study in the analysis of the amount of use among home health users were the demographic groups and the high historical Medicare use group examined above, plus two agency subgroups (for-profit agencies, hospital-based agencies), and six diagnostic groups identifying beneficiaries with these diagnoses for their home health care. As with the incidence of use analysis, many of the subgroups had differential effects, however, the magnitude of the differences in absolute or relative terms often was not substantial (see Table 5). Of the 13 subgroups examined, 9 had negative differential impacts but the overall estimated reduction in their number of visits ranged from 33 to 53 visits as compared to an average decrease of 31 visits. This is a relative decrease of 36 percent to 45 percent, as compared to an average relative decrease of 39 percent.⁵

Three of the demographic subgroups—85 years of age and older, nonwhite, and females—all had differential effects post-BBA. Those beneficiaries 85 years of age and older had higher than average pre-BBA utilization, 91 visits, with a decrease of 43 percent, or 39 visits. Nonwhites, with an even higher pre-BBA utilization, 112 visits, saw a reduction of 44 percent, or 49 visits.

Table 5: Estimated Difference for Selected Subgroups in the Number of Home Health Visits and RVUs Post-BBA and Whether They Experienced a Differential Impact Post-BBA

	<i>Estimated Difference* (p-value)</i>	<i>1997</i>	<i>Estimated Difference as % of 1997</i>	<i>Differential Impact? (direction)</i>
Visits				
Sample average	- 30.78 (<i>p</i> < .01)	78.84	- 39	
85 and older	- 39.00 (<i>p</i> < .01)	91.32	- 43	Yes (-)
Female	- 32.84 (<i>p</i> < .01)	81.53	- 40	Yes (-)
Nonwhite	- 48.72 (<i>p</i> < .01)	111.50	- 44	Yes (-)
Buy-in	- 41.92 (<i>p</i> < .01)	101.77	- 41	No
High Medicare states	- 49.60 (<i>p</i> < .01)	114.08	- 43	Yes (-)
Agency for-profit	- 49.38 (<i>p</i> < .01)	112.03	- 44	Yes (-)
Agency hospital-based	- 18.53 (<i>p</i> < .01)	55.20	- 22	Yes (+)
Diabetes	- 49.73 (<i>p</i> < .01)	122.92	- 40	Yes (-)
Hypertensive disease	- 38.93 (<i>p</i> < .01)	89.62	- 43	No
Heart failure	- 41.41 (<i>p</i> < .01)	92.75	- 45	Yes (-)
Cerebrovascular disease	- 40.67 (<i>p</i> < .01)	91.95	- 44	Yes (-)
Chronic airway obstruction	- 28.72 (<i>p</i> < .01)	71.29	- 40	No
Skin ulcers	- 52.66 (<i>p</i> < .01)	145.12	- 36	Yes (-)
RVUs				
Sample average	- 19.58 (<i>p</i> < .01)	59.18	- 33	
85 and older	- 23.28 (<i>p</i> < .01)	65.03	- 36	Yes (-)
Female	- 20.78 (<i>p</i> < .01)	60.74	- 34	Yes (-)
Nonwhite	- 30.26 (<i>p</i> < .01)	81.10	- 37	Yes (-)
Buy-in	- 26.46 (<i>p</i> < .01)	75.38	- 35	No
High Medicare states	- 30.49 (<i>p</i> < .01)	81.46	- 37	Yes (-)
Agency for-profit	- 31.54 (<i>p</i> < .01)	82.55	- 38	Yes (-)
Agency hospital-based	- 11.96 (<i>p</i> < .01)	44.16	- 27	Yes (+)
Diabetes	- 34.19 (<i>p</i> < .01)	96.54	- 35	Yes (-)
Hypertensive disease	- 24.32 (<i>p</i> < .01)	65.32	- 37	No
Heart failure	- 26.09 (<i>p</i> < .01)	67.70	- 39	Yes (-)
Cerebrovascular disease	- 24.54 (<i>p</i> < .01)	68.25	- 36	Yes (-)
Chronic airway obstruction	- 18.23 (<i>p</i> < .01)	53.28	- 34	No
Skin ulcers	- 33.78 (<i>p</i> < .01)	111.89	- 30	Yes (-)

Sources: CMS Denominator, Standard Analytic Files, Provider of Services, Cost Report and Area Resource Files.

*The difference was estimated from the parameters of the OLS regression. The OLS model controls for beneficiary demographic, prior use, community, characteristics of the agency where the home care was received, diagnoses for which home care was being received, and all the independent variables interacted with POST BBA. Predicted probabilities were estimated for the selected subgroup members first as if they were in the pre-BBA period and then as if they were in the post-BBA period. The mean of the difference between these two predicted probabilities across the sample members is the estimated difference. The *p*-value of the estimated difference is the *p*-value of the coefficient of POST BBA.

Females, who had only a slightly higher than average utilization pre-BBA of 82 visits, had a reduction of 40 percent, or 33 visits. Medicaid buy-ins did not experience a differential effect in the post-BBA period.

Home health users in states with high historical Medicare home health use and those seen by for-profit agencies also had differential reductions in use post-BBA. Both groups went from a high mean home health visit rate (114 visits for high Medicare states, 112 visits for for-profit agencies) to 64 and 63 visits, respectively. Overall, the relative difference in visit rate was 43 percent for beneficiaries in high historical Medicare home health use states and 44 percent for beneficiaries seen by for-profit agencies. The comparison between their visit and RVU reductions post-BBA indicated stronger reductions for less intensive services.

Home health users seen by hospital-based agencies had a smaller decrease in the number of visits, only 19, from a pre-BBA average of 55 visits. Their percentage decrease was 22 percent, well below the sample average of 39 percent. Both their initial utilization rate and the amount and percentage of their decrease were substantially below average. Unlike all the other groups in Table 5, their decrease was greater for RVUs than for visits, which indicates proportionately larger decreases in more intensive services. Being a home health user seen by a hospital-based agency in the post-BBA period had an additional significant positive effect on utilization. These findings suggest that this group was more likely receiving postacute care. Comparisons of their characteristics with those beneficiaries seen by non-hospital-based agencies indicated smaller percentages of racial minorities and of individuals having dual Medicare and Medicaid eligibility. They also had considerably smaller home health utilization in both the pre- and post-BBA period with a larger percentage of skilled services provided.

Of the six diagnosis groups examined, four had differential impacts post-BBA. Home health users receiving care for diabetes and skin ulcers had a 50-plus visit decrease in use from a pre-BBA level of 123 visits and 145 visits, respectively, which is a slightly larger relative decrease than average for diabetes (40 percent versus 39 percent), but a smaller percentage decrease for skin ulcers (36 percent versus 39 percent). Both diabetes and skin ulcers were differentially impacted in the post-BBA, experiencing significant decreases in utilization for being both in the diagnosis group and being post-BBA.

Beneficiaries receiving home health care for heart failure, cerebrovascular disease, and hypertensive disease had pre-BBA utilization in approximately the same range, 90 to 93 visits. Beneficiaries with heart failure and cerebrovascular disease reduced their utilization 41 visits, a relative decrease

of 45 percent for heart failure and 44 percent for cerebrovascular disease. Hypertensive disease visits decreased 39 visits, or a relative decrease of 43 percent. Two of these three groups experienced differential impacts post-BBA: heart failure and cerebrovascular disease. For both, the significant interaction effect observed resulted in fewer visits and RVUs. Having a hypertensive disease diagnosis and being in the post-BBA was not a significant interaction.

Beneficiaries with chronic airway obstruction had the smallest number of visits (71) of the groups examined pre-BBA and experienced a smaller decrease in the number of visits (29); a 40 percent relative reduction. They did not experience a differential impact post-BBA.

SUMMARY AND DISCUSSION

This paper estimates the early impact of the BBA on a range of home health utilization measures and examines whether particular subgroups of the Medicare population were differentially impacted. Yearly utilization of home health services was studied for a 1 percent sample of the Medicare beneficiaries for fiscal years 1997 and 1999, the full year before and the full year after implementation of the home health IPS, part of the BBA of 1997. The analysis was conducted in two parts.

The first part examined the incidence of home health use. The study modeled the effect of the BBA, controlling for beneficiary demographic characteristics; prior medical care use; and community characteristics, including Medicare and Medicaid historical home health experience. All these control variables interacted with the variable POST BBA. These interaction terms were included both because it was believed that the BBA was an effect modifier and because of the interest in examining subgroups of the population that were hypothesized to be differentially impacted by the policy changes.

The second part looked at the amount of home health care use among users of home health services. The impact of the BBA was estimated in a model that controlled for all the variables in the incidence of use analysis; characteristics of the home health agency providing the services; and the diagnoses for which home health care was being received. All the control variables interacted with the variable POST BBA.

While the models include measures developed from the data available, it should be noted that the data are limited by the data elements in the claims and

eligibility files and thus do not include measures of functional status or information that would be available from a survey such as living arrangement, informal support, and use of non-Medicare services. Thus, despite the independent variables that are included, the model may not fully account for differences in the population pre- and post-BBA. In addition, the models do not directly account for changes in environmental factors between the two time periods, such as changes in the supply and reimbursement of other postacute services.

Results show:

- A 22 percent decrease in the percentage using home health services during the period, from 10.1 percent of the Medicare beneficiary population in 1997 to 7.9 percent in 1999.
- A 39 percent decrease in the number of visits per home health user from an average of 78.8 visits in 1997 pre-BBA to 48.1 home health visits post-BBA.
- A different pattern of reduction in the number of services for the six home health disciplines. Reductions ranged from a 54 percent decrease (38.4 to 17.7) in the number of aide visits to a 6 percent increase (1.04 to 1.10) in the number of speech language pathology visits. Medical social work visits decreased 38 percent (0.82 to 0.50), skilled nursing visits 29 percent (32.2 to 22.9), occupational therapy visits 20 percent (0.41 to 0.33), and physical therapy visits 7 percent (6.0 to 5.6).
- A 33 percent reduction in the relative value of home health services received per user of home health services post-BBA.

Among the subgroups examined for differential impacts, stronger reductions in the incidence of use were found for beneficiaries 85 years of age and older, those in states with high historical Medicare home health use, and beneficiaries for whom Medicaid buys into Medicare Part B. Differential impacts were not found for females or nonwhites. It should be noted that while these differential impacts were significant, they were not very large on an absolute or relative basis. These three subgroups with differential effects on their incidence of use ranged from relative reductions of one to five percentage points larger than the average reduction.

More pronounced reductions experienced by the high historical use states indicate that agencies in these states may have had more opportunity to find reductions because of the relative generosity of their eligibility and

utilization practices pre-BBA. Older beneficiaries and those with Medicaid buy-in are likely to be more chronically ill than other Medicare beneficiaries and may have dropped out of Medicare home health as the eligibility and coverage rules were tightened. Intravenous antibiotic therapy was no longer provided and venipuncture was no longer a qualifying skilled-care service. To the extent that these services made chronically ill beneficiaries eligible for the Medicare home health benefit, these beneficiaries were able to receive personal care services to support their more chronic needs.

As hypothesized, groups with higher than average use pre-BBA experienced differential decreases in the post-BBA period in the number of services provided to home health users. Again, some of these differences, while significant, were not very substantial. The smallest difference found significant was only 2 visits less or a 40 percent relative decrease for females, as compared to the 39 percent average decrease. The biggest relative decrease found was 45 percent, or a decrease of 11 visits for home health users receiving care for heart failure.

Groups with differential additional decreases included two of the subgroups identified in the incidence of use analysis (those in states with high historical Medicare use, beneficiaries 85 years of age and older), plus nonwhites and females. However, Medicaid buy-in was not associated with a differential impact.

The effect post-BBA was intensified for users of for-profit agencies as these agencies had extra reductions in their visit rates. For-profit agencies had higher than average visit levels pre-BBA with a rate about 40 percent higher than the average pre-BBA rate. The opposite effect was found for hospital-based agencies. They had 25 percent lower than average visit levels pre-BBA and smaller reductions in visit rates. This finding is likely related to hospital-based agencies serving a client base more likely to be receiving postacute care than those patients served by other types of agencies.

The analysis also examined particular diagnosis groups hypothesized to experience differential reductions in service use post-BBA: those beneficiaries being treated for diabetes, hypertension, heart failure, cerebrovascular disease, chronic airway obstruction, and skin ulcers. These conditions were all associated with a higher than average number of visits of home health pre-BBA and heavy use of unskilled home health aide services. Differential reductions in service use were found for all diagnosis groups but hypertensive disease and chronic airway obstruction.

The home health reductions that occurred post-BBA were strong for all types of Medicare beneficiaries but some subgroups did experience

differential effects. More intensive reductions were found for those beneficiaries more prone to have chronic conditions and those with high home health use pre-BBA. Less intensive reductions were found for those beneficiaries served in hospital-based agencies, who are more likely to be receiving postacute care.

All of these findings should not be surprising as they demonstrate that public program expenditures can be sharply curtailed with financial incentives. However, these reductions do not necessarily point to problems in and of themselves, especially for a benefit that was widely thought to have been provided in an inefficient manner pre-BBA.

The intent behind the BBA legislation was to rein in use of the Medicare home health benefit for more chronic long-term personal home health services. Beneficiaries using these services are likely to be among the most vulnerable because of their chronic care needs, and thus, if the legislation is successful in its intent, they are most likely to be more strongly affected. This study demonstrates the realization of this predictable reaction.

The questions that remain are twofold. Do these reductions in beneficiary use result in poor health care outcomes for beneficiaries, the Medicare program, or the health care system? What implications do these findings have for the ongoing reform of home health reimbursement, which has now gone beyond the IPS and related compliance initiatives?

The first of these questions will be pursued by other analyses that are part of the larger research effort being funded by the Robert Wood Johnson Foundation through the Center for Home Care Policy and Research at the Visiting Nurse Service of New York, of which this article is a part. These reductions in service use are truly dramatic and provide the opportunity to explore the consequences of such a substantial reduction in what is arguably the most popular set of services available through the Medicare program. Specifically, future analyses will investigate issues related to whether there appears to be weakening in the quality of care provided or beneficiary satisfaction with the care received; acceleration of the incidence of adverse health events or costly alternative service use; or undesirable effects on home health agencies or the health care system.

The implication for future home care policy is more complicated. Beginning in October 2000, home health reimbursement shifted from the rules in place under the IPS, which included aggregate per-visit and per-beneficiary limits, to a prospective payment system (PPS). The PPS capitates a 60-day episode of home health modifying the agency payment

for clinical and service use needs. There is no limit on the number of patient episodes.

While the incentives created by the PPS are different than those in place during the period of our study, the rapid and dramatic reaction of the agencies immediately after the interim payment system's implementation suggests the importance of timely monitoring, especially for vulnerable subgroups, which would include analysis of claims information, cost data, and data on the quality of care provided. Assessment of the availability of these data sources as part of these analyses suggests that much more effort will be needed to make such monitoring data accurate and available on a timely basis. Without such data, the promise of PPS may be overwhelmed by its own potential problems of underservice and overpayment.

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NOTES

1. The relative value units for each discipline were developed from the FFY 2000 per-visit Metropolitan Statistical Area (MSA) and non-MSA limits for each discipline (Centers for Medicare and Medicaid Services 1999). The MSA and non-MSA limits were weighted by the proportion of the Medicare population in MSA and non-MSA areas (72 percent MSA and 28 percent non-MSA) and the relative value units were developed from the resulting per-visit discipline limits by dividing each discipline's per-visit limit by the per-visit limit of a skilled nursing visit.

2. One issue that arises in this analysis is that some people are found in both the 1997 and 1999 samples. Among home health users, 23 percent of the users in 1997 are also users in 1999. Because the outcomes for an individual are likely to be autocorrelated over time, standard analysis techniques are not optimal for two reasons. First, the estimates are inefficient because techniques that explicitly account for the sample overlap would provide parameter estimates with lower standard errors. However, this problem does not lead to bias or inconsistency in the parameter estimates. Second, the estimates of the standard errors are themselves biased. For the analysis in this paper, these problems are of limited relevance because the sample size is so large that any inefficiency of the estimates or bias in the standard errors is not an issue. Results would still be highly significant even if we assumed that the true standard errors were 25 percent larger than the estimated standard errors.
3. Prior Medicare use is adjusted for time trends using Medicare data. Inpatient days of care for the program as a whole for the six months prior to fiscal years 1997 and 1999 decreased from .8958 to .8583 days and Medicare SNF days of care increased from .5025 to .5151 days. The post-BBA data was adjusted to the pre-BBA data to adjust for the trends in use.
4. Being a new agency was included as a selected characteristic because new agencies were reimbursed differently under IPS. New agencies, defined by CMS as an agency that did not file a Medicare cost report for FY 1994, had their per beneficiary limits calculated using the national median costs rather than a blended rate based 75 percent on their agency costs and 25 percent on their census region costs. A CMS analysis found that on average new agencies had higher costs related to higher levels of utilization and therefore would likely be affected more strongly by the IPS. This would especially be the case for new agencies in high-cost census regions (Centers for Medicare and Medicaid Services 1998).
5. Note skin ulcers actually decreased less than the average (36 percent versus 39 percent). The overall decrease post-BBA is the sum of the coefficients on the three variables: POST BBA, skin ulcers, and POST BBA interacted with skin ulcers. Even though the interaction term was significant and negative, the skin ulcers variable had a sufficiently large positive coefficient to result in the overall effect of skin ulcers being a less than the average decrease.

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