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# Do Preset per Visit Payment Rates Affect Home Health Agency Behavior?

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*This article reports on preliminary impacts during the first year of a demonstration in which home health agencies (HHAs) were paid a prospectively set rate for each Medicare home health visit rendered, rather than being reimbursed for costs. Forty-seven agencies in five States participated. The evaluation compared the experiences of randomly assigned treatment agencies and their patients with those of control agencies and their patients and found no compelling evidence of any demonstration impact on agency cost per visit, the volume of home health services, agency revenue and profit, patient selection and retention, quality of care, or use and cost of Medicare services.*

## INTRODUCTION

In recent years, home health care has been the fastest growing Medicare benefit. Medicare home health spending was estimated at \$10.2 billion in fiscal year (FY) 1993—a 42-percent increase over FY 1992 and a 298-percent increase over FY 1989 (U.S. House of Representatives, 1993).

As one of its many initiatives to make provision of Medicare services more cost effective, HCFA has implemented a

demonstration program of prospective payment for home health care. The major goal of introducing prospective payment to home health care is to minimize public expenditures by providing care more efficiently while ensuring that access to care and the quality of care are adequate.

During the first phase of this demonstration, participating agencies were paid a prospectively determined rate for each home health visit rendered to Medicare beneficiaries. Under the second phase of the demonstration, agencies will be paid a prospectively determined rate for each episode of home health care they render. In both phases of the demonstration, agencies retain most of any reasonable surplus of payments over costs and are at risk for shortfalls, giving them a financial incentive to provide home care in a more cost-efficient manner than they might under the current method of cost reimbursement. HHAs are currently reimbursed for reasonable costs incurred. Costs are judged to be reasonable if they do not exceed specified limits. During the per visit demonstration, the limits in effect for freestanding agencies were set at 112 percent of the mean cost per visit incurred by all agencies in the same geographic area. The limits for hospital-based agencies were 13 to 16 percent higher than those for freestanding agencies. The limits are applied in the aggregate; costs that are above the limit for one type of visit may be offset by lower costs for another type of visit.

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This article is derived from material first produced under Contract Number 500-90-0047 from the Health Care Financing Administration (HCFA) to Mathematica Policy Research, Inc., and the Bigel Institute for Health Policy, Brandeis University. Barbara R. Phillips, Randall S. Brown, Craig V. Thornton, Amy C. Klein, and Jennifer L. Schore are with Mathematica Policy Research, Inc. Christine E. Bishop, Grant A. Ritter, and Kathleen C. Skwara are with the Bigel Institute for Health Policy, Brandeis University. The opinions expressed are those of the authors and do not necessarily reflect the views or policy positions of Mathematica Policy Research, Inc., Brandeis University, or HCFA.

This article reports on our early estimates of the impacts of per visit prospective payment, estimated on data from the first year of the per visit home health prospective payment demonstration. We examine impacts on per visit costs, use of home health services, agency financial performance, selection and retention of patients, and quality of care. These preliminary findings are not necessarily indicative of program impacts during the life of the demonstration.

## THE PER VISIT DEMONSTRATION

According to the terms of the per visit demonstration, the prospectively set rates that an agency received for the six types of home health visits covered by Medicare (skilled nursing, physical therapy, occupational therapy, speech therapy, medical social services, and home health aide) were based on the agency's own costs during a base year (the year immediately preceding its entry into the demonstration), adjusted annually for local increases in the prices of inputs required to produce health services.

In recognition of the inverse relationship between volume and average per visit costs for home health services, the demonstration also included provisions to adjust the payment rate downward (from base-year costs) for agencies that grew appreciably and upward for those that shrank. Rates were decreased 1 percent for every 10-percentage-point increase in the number of Medicare visits rendered (relative to the base year) and increased 1 percent for every 10-percentage-point decrease in the number of such visits. Although research indicates that average cost per visit varies inversely with the volume of home health visits rendered and average cost per visit for home health care, there is considerable uncertainty about their exact relationship.

Cross-sectional analyses (which investigate the differences in average cost per visit for agencies that render different volumes of output during a given period and which assume that the underlying cost structure of the home health industry is in economic equilibrium) have generally concluded that smaller agencies experience economies of scale as they grow. However, the results of these studies differ with respect to the magnitude of these economies and the range over which they apply (Hay and Mandes, 1984; Kass, 1987; Nyman and Svetlik, 1989; Schmitz, 1990; Chu, Brown, and Phillips, 1993). Longitudinal analyses investigating the relationship between the year-to-year change in the average cost per visit and the change in the volume of output (Schmitz, 1989; Chu, Brown, and Phillips, 1993) suggest much larger changes in average cost per visit as volume changes than do the cross-sectional analyses.

The demonstration included provisions for HCFA to share profits and absorb losses that exceeded certain levels. At the end of each year, HCFA shared in any profits greater than 5 percent of an agency's Medicare-allowable cost of providing the prospectively paid services. HCFA also reimbursed agencies for any losses greater than 5 percent of these costs, provided the payment did not exceed the cost limits.

The demonstration also included procedures to ensure that the number of visits rendered was appropriate and that the quality of care was adequate. The number of visits was monitored through a medical review process identical to that under cost reimbursement, and an independent organization reviewed a sample of cases from each prospectively paid agency to assess the quality of care rendered. Forty-seven agencies in the five demonstration States (California, Florida, Illinois, Massachusetts, and Texas) participated in the per visit demonstration

for at least 1 year, entering between October 1990 and October 1991, as their FYs began. (Two other agencies dropped out before the end of their first year.) Each agency operates under the demonstration for a total of 3 years; thus, demonstration operations will be completed at the end of September 1994.

As Table 1 indicates, the agencies participating in the demonstration represented a broad mix of HHAs. They operated under a mix of auspices, with most being proprietary. A little more than one-fourth were members of a chain. The majority of demonstration agencies had been in operation for more than 6 years.<sup>1</sup> They predominantly served Medicare patients, and most demonstration agencies offered all six home health services covered by Medicare. The demonstration agencies varied in size, from more than 240,000 Medicare visits during their base year to only 122 Medicare visits during that year. Most of the demonstration agencies had been growing prior to entering the demonstration; more than one-half of them had experienced rapid growth prior to entering the demonstration, increasing the number of Medicare visits rendered by 30 percent or more. Four out of every five of the demonstration agencies had base-year costs that were below the limits, and more than one-third had base-year costs that were less than 85 percent of the limits.

The participating agencies were randomly assigned to either a treatment group, which was paid under the demonstration's prospective ratesetting mechanism, or a control group, which was paid under Medicare's normal cost-reimbursement procedure. Because the number of agencies participating in the demonstration was small, the treatment and control groups

differed somewhat despite randomization. Although not statistically significant, there were material predemonstration differences between treatment and control agencies that may have affected the outcome we examined, including differences in agency size and costs. Table 1 provides descriptive statistics on treatment and control agencies.

## RESEARCH ISSUES

Paying HHAs a fixed, predetermined amount per visit creates a number of incentives. Because agencies retain profits (or surpluses), they will benefit from selecting the most efficient way to deliver their services, perhaps altering direct care or administrative operations. Agencies may also want to increase the volume of services rendered to benefit from economies of scale. In addition, agencies that are able to reduce their costs below the per visit payment have an incentive to increase the number of visits provided because each visit generates additional net revenue.

Patient care may be affected by these incentives. The fixed rate of payment per visit could encourage agencies to avoid or drop certain patients who require lengthy or expensive visits or to make operational changes (such as requiring staff to make more visits per day or reducing supervisory staff) that might result in a poorer quality of care and, perhaps, in higher use of other Medicare services. On the other hand, an increase in volume of visits rendered could lead to better care for beneficiaries and, as a result, could reduce the use of other Medicare services.

Thus, a full understanding of the effects of prospective ratesetting for home health care requires that a number of potential program outcomes be addressed. In this article, we examine data from the first year of demonstration operations to test

<sup>1</sup>Agencies that had been operating for fewer than 3 years (as of the base year) were excluded from the demonstration.

**Table 1**  
**Base-Year Characteristics of Treatment and Control Agencies in the Demonstration**

Characteristic	Treatment	Control
<b>Auspice (Percent)</b>		
Hospital-Based	19	10
Proprietary	54	62
Non-Profit	27	29
<b>Chain Member (Percent)</b>	23	33
<b>Years of Operation (Percent)</b>		
5 or Fewer	35	24
6-20	54	62
More Than 20	12	14
<b>Location of Fiscal Intermediary (Percent)</b>		
California	19	19
Florida	12	10
Illinois	15	19
Iowa	15	14
Maine	12	14
New Mexico	27	24
<b>Number of Medicare Visits Rendered (Percent)</b>		
3,500 or Fewer	15	19
3,501-7,000	23	10
7,001-15,500	15	38
More Than 15,500	46	33
<b>Provided All Six Medicare Services (Percent)</b>	65	57
<b>Visits Covered by Medicare (Percent)</b>		
50 Percent or Less	15	5
51-70 Percent	15	10
71-90 Percent	15	19
More Than 90 Percent	54	67
<b>Cost per Visit</b>		
Skilled Nursing	\$87	\$72
Physical Therapy	74	73
Speech Therapy	79	78
Occupational Therapy	80	72
Medical Social Services	134	94
Home Health Aide	39	38
<b>Growth in Medicare Visits (Percent)<sup>1</sup></b>		
Decline	12	10
Growth up to 30 Percent	35	35
30-80 Percent	31	35
More Than 80 Percent	23	20
<b>Ratio of Costs to the Limits (Percent)</b>		
0.70 or Less	12	15
0.71-0.85	19	25
0.86-1.0	42	50
More Than 1.0	27	10
<b>Patients Discharged From Hospital (Percent)</b>	52	52
<b>Number of Hospital Stays in Prior Year for Agency Patients</b>	1.72	1.65

<sup>1</sup>Growth rates given are from the year prior to base year to the base year.

SOURCE: Data on auspice and chain membership were obtained from the demonstration contractor, Abt Associates, inc. Data on related organizations and years of operation were obtained from the initial agency survey for the demonstration. All other data were obtained from Medicare Cost Reports. Data are for 26 treatment agencies and 21 control agencies.

hypotheses about the possible effects of prospective ratesetting on:

- Cost per visit, by type of visit and type of cost.
- The use of home health services (including the volume of visits rendered by agencies) and characteristics of episodes (including duration, intensity, and number of visits).
- Agencies' net revenues and profits.
- Patient selection and retention.
- Quality of care.
- Use and costs of all Medicare-covered services by agency patients.

We tested a number of hypotheses under each of these areas, most of which stated that prospective ratesetting had no effect on the outcome examined. The only directional hypotheses tested were for cost per visit; these stated that prospective ratesetting did not reduce per visit costs. Many of the specific hypotheses examined will be evident from the tables to be presented.

When data for all 3 years of the demonstration become available, we will examine the same issues for the demonstration in its entirety and will also examine impacts on the use of services not covered by Medicare. (Data on the use of these services were collected only once during the second demonstration year.)

## DATA AND METHODOLOGY

The analysis relies on data from many sources and from a number of samples, some of which are based on agency-level data. Most of the agency-level analyses rely on data for the 3 predemonstration years and for the first demonstration year, with the agency-year as the unit of analysis. The number of agency-years for which data were available varies from 134 to 189, depending on the analysis. Other analyses of agency-level data are limited to the first

demonstration year only and data for 41 to 49 agencies, depending on the analysis.

Many analyses use data on individual home health patients in the treatment and control agencies during the first demonstration year. For these analyses, the unit of analysis is the home health episode, as defined by agency-reported start and end dates.<sup>2</sup> In general, the number of episodes included varies from 24,366 to 25,339, depending on the analysis.

Our samples are for virtually the entire population of agencies participating in the demonstration and all of the episodes they rendered during the first demonstration year. However, it is useful to consider the statistical power that would be available for testing hypotheses if they were random samples of agencies and episodes. Only substantial differences can be detected with the agency-level data. For cost per visit, a key dependent variable, the unit of analysis is agency-year. For a range of assumptions about the correlation of observations across years and the amount of variance of the dependent variable explained by our regression models, we estimate that we can detect differences in cost per visit of about one-third to one-half a standard deviation, or about 15 to 25 percent of the mean, with 80-percent power.<sup>3</sup> The statistical power of the episode-level analysis is sufficient (even with conservative assumptions) to allow us to detect a difference of approximately 10 percent of the standard deviation of the dependent variable (equivalently, about 5 percentage points in a binary variable) with 80-percent power.<sup>4</sup>

<sup>2</sup>The end date used is the closing date of the final bill submitted by an agency for a given episode.

<sup>3</sup>In our sample, the correlation in the total cost of a skilled nursing visit between the base year and the previous year is 0.8, and our models explain about 70 percent of the variance in total cost of a skilled nursing visit. The minimum detectable difference is about one-third of the standard deviation (\$38 in our sample), or about 16 percent of the sample mean of \$80.

<sup>4</sup>This estimate is for a one-tailed test of differences in simple means; the minimum detectable difference will be smaller for regression-adjusted means. We have assumed that the proportion of variance that is agency-specific is .07, which is the observed value in our sample for the number of visits per episode, and that the variance of the binary variable is .25 (the maximum possible).

Data to construct variables were drawn from a number of sources. A great deal of the data on agencies were obtained from Medicare Cost Reports; Medicare claims constituted the primary data source for the episode-level analyses. Other key data sources included the demonstration-agency survey, home health certification (HCFA 485 and 486) forms, patient intake forms developed for this evaluation, Medicare eligibility file, and reviews of case records by the quality assurance contractor, New England Research Institute (NERI). Some variables also were developed from the Provider of Service File, section 223 limit file, Area Resource File, agency financial statements, and predemonstration agency characteristics data collected by Abt Associates Inc., the technical assistance contractor for the demonstration.

The basic methodology of all of our analyses is to compare the experiences of the treatment and control agencies and their patients to estimate the impact of per visit ratesetting. In virtually all of the impact analyses, we control for differences between treatment and control agencies that arose by chance, using ordinary least squares regression (for continuous dependent variables) and logit analysis (for binary dependent variables). To account for the correlation between observations on a given agency across years in those analyses using the agency-year as the unit of analysis, we estimated two specifications: (1) a fixed-effects model (which controls for time-invariant, agency-specific factors by including a series of binary variables representing agencies)<sup>5</sup> and (2) a random-effects model (which includes an agency-specific component in the error term). The

<sup>5</sup>Or, equivalently, by transforming each dependent and independent variable into deviations around its agency-specific mean during the 4 observed years.

random-effects model provides more precise estimates; however, these will be biased if unmeasured agency characteristics are correlated with treatment status. The fixed-effects model, on the other hand, yields unbiased but less precise estimates.

We present the estimated impacts of per visit ratesetting obtained from our multivariate models. To help put the magnitude of an impact estimate in perspective, we also present the treatment group mean for the demonstration period.

## FINDINGS

Regardless of the issue examined, we find no compelling evidence that prospective ratesetting had any impact during the first year of the demonstration.

### Cost per Visit

Our estimates suggest that prospective ratesetting has not led to lower costs per visit among treatment agencies, for any type of visit, than would have occurred in the absence of the demonstration. This finding holds for both total cost per visit, which includes allocated overhead expenses, and direct cost per visit, which excludes such expenses. Using data from the 3 years preceding agencies' entry into the demonstration and from the year after entry, average cost per visit for each type of visit was regressed on time and treatment-status interaction terms, plus agency and area characteristics. The impacts on costs were estimated from the model coefficients as the predicted difference between treatment and control agencies in the change in average cost per visit between the 3-year predemonstration period and the postdemonstration year, controlling for the various agency and area characteristics.

**Table 2**  
**Impacts on Total Cost per Visit: Fixed-Effects Model, Excluding Control Variables for Volume and Case Mix, by Type of Visit**

Type of Visit	Unadjusted Treatment Group Mean	Estimated Impact of per Visit Ratesetting
Skilled Nursing	\$88.01	\$1.51 (0.30)
Home Health Aide	\$39.87	\$3.94 (0.92)
Physical Therapy	\$87.66	\$3.67 (0.28)
Occupational Therapy	\$88.79	-\$6.08 (-0.69)
Speech Therapy	\$81.68	-\$2.01 (-0.25)
Medical Social Services	\$133.48	-\$28.39 (-0.70)

NOTES: Numbers in parentheses are t-statistics. The estimated impact of per visit ratesetting is computed as the expected value of the treatment-control difference in the demonstration year minus the average treatment-control difference in the predemonstration period, estimated from the coefficients of the fixed-effects model. The unit of analysis is the agency-year. The sample size varies by type of visit (not all agencies offered all types of visits). The maximum number of agency-years is 189, and the minimum is 134. The maximum number of agencies in any given year is 48 (27 treatment and 21 control), and the minimum is 32 (19 treatment and 13 control).

SOURCE: Authors' calculations from Medicare Cost Report data.

The findings are not sensitive to the econometric specification used to account for the correlation of an agency's costs across years (that is, a random- or fixed-effects model) nor to the set of control variables used to account for possible pre-existing differences between treatment and control agencies. Because there were material predemonstration differences between the treatment and control agencies in agency size and costs, we included concurrent measures of volume and case mix as control variables in some of the models. Concurrent measures of volume and case mix could be affected by treatment status, however, and their inclusion could possibly bias our estimates of the full impact of prospective ratesetting. Therefore, we also estimated models that included only predemonstration agency characteristics as control variables.

Of the 48 estimates obtained (6 visit types, 2 types of costs, 2 sets of control variables, and 2 econometric specifications), none was significantly different from 0. Furthermore, the estimates were as likely to show a cost

increase as they were to show the hypothesized cost decrease. To illustrate, Table 2 presents impact estimates for total cost per visit for each of the six visit types from the fixed-effects model, excluding control variables for volume and case mix.

### Use of Home Health Services

The opportunity to retain savings and the greater risk of losses under prospective payment provide treatment agencies with incentives to reduce their cost per visit by shifting the total volume toward a more efficient level and to increase net revenue by shifting toward the types of visits or patients for which profit margins are the greatest. In general, the incentives are to increase the volume of visits rendered. However, because prospective rates are set at the agency's own base-year average cost, different shifts in volume may be appropriate for different agencies, depending on their own size and cost structures.

Despite the incentives under the demonstration, we find no compelling evidence

**Table 3**  
**Impacts on Medicare Visits Rendered: Random-Effects Model, Controlling for Agency Characteristics, Volume, and Case Mix, by Type of Visit**

Type of Visit	Unadjusted Treatment Group Mean	Estimated Impact of per Visit Ratesetting
Total	37,982	1,760 (0.23)
Skilled Nursing	20,353	3,697 (0.90)
Home Health Aide	12,651	-630 (-0.24)
Physical Therapy	3,683	-252 (-0.24)
Occupational Therapy	533	-25 (-0.13)
Speech Therapy	238	14 (0.18)
Medical Social Services	524	52 (0.33)

NOTES: Numbers in parentheses are *t*-statistics. The unit of analysis is the agency-year. The sample size varies by type of visit (not all agencies offered all types of visits). The maximum number of agency-years is 189, and the minimum is 138. The maximum number of agencies in a given year is 48 (27 treatment and 21 control), and the minimum is 32 (19 treatment and 13 control).

SOURCE: Authors' calculations from Medicare Cost Report data.

that during the first demonstration year treatment agencies have either increased or decreased total visits, Medicare visits, or Medicare visits as a proportion of total visits, relative to control agencies. This finding is not sensitive to the econometric specification (that is, a fixed- or random-effects model) nor to the set of control variables. Some models included only predemonstration agency and area characteristics. Other models included variables describing the mix of patients served by each agency during the first demonstration year. To illustrate, Table 3 presents impact estimates for Medicare visits for each of the six visit types from the random-effects model, controlling for predemonstration agency characteristics and case mix during the first demonstration year.

Treatment agencies appear to have treated their patients differently, or served a different mix of patients, than did control agencies. After controlling for observed differences in patient characteristics, agency predemonstration behavior concerning episode duration

and intensity, and agency characteristics, we estimate that the patients of treatment agencies received significantly fewer visits per episode and significantly more visits per week than did the patients of control agencies, although the duration of episodes did not differ for the two groups (Table 4). Given the lack of evidence of program effects on total agency volume and the demonstration incentive to increase the number of visits, it is difficult to plausibly explain how prospective ratesetting might be responsible for a reduction in visits per episode. Moreover, these estimates are internally inconsistent. Visits per episode equals visits per week multiplied by episode duration (in weeks); therefore, the estimated percent change in visits per episode should equal the estimated percent change in duration plus the estimated percent change in visits per week. Our results controlling for patient characteristics, predemonstration behavior, and agency characteristics, however, indicate a sizable percent reduction in visits per episode (-9.5 percent), which is not consistent with the small percent reduction



**Table 4**

**Treatment-Control Differences in Home Health Visits per Episode, Duration, and Visits per Week (Medicare Only), by Outcome**

Outcome	Unadjusted Treatment Group Mean	Treatment-Control Difference Controlling for:		
		Patient Characteristics Only	Patient Characteristics and Past Agency Behavior	Patient Characteristics, Past Agency Behavior, and Agency Characteristics
Total Visits per Episode	34.3	-9.7 **(-10.84)	-6.0 **(-6.67)	-3.6 **(-3.55)
Skilled Nursing	19.3	-2.6 **(-5.17)	-1.1 *(-2.18)	1.4 *(-2.47)
Home Health Aide	11.3	-7.0 **(-12.38)	-4.8 **(-8.50)	-3.8 **(-5.92)
Physical Therapy	2.7	-0.3 **(-2.86)	-0.2 (-1.72)	-1.0 **(-4.21)
Occupational Therapy	0.3	0.1 (2.29)	0.1 (1.79)	-0.1 (-1.73)
Speech Therapy	0.2	-0.1 (-0.32)	-0.02 (-0.49)	-0.1 (-1.78)
Medical Social Services	0.4	0.1 **(-5.89)	0.1 **(-3.90)	-0.1 **(-5.10)
Duration of Episode (Days)	65.1	-9.8 **(-9.23)	-6.2 **(-5.81)	-2.3 (-1.91)
Visits per Week	3.7	-0.2 **(-6.32)	-0.1 **(-3.41)	0.1 **(-3.13)

\*Significantly different from zero at the .05 level, two-tailed test.

\*\*Significantly different from zero at the .01 level, two-tailed test.

NOTES: Numbers in parentheses are t-statistics. The sample size is 25,339 (19,029 treatment and 6,310 control) episodes.

SOURCE: Authors' calculations from Medicare claims data.

in duration (-3.4 percent) and the increase in visits per week observed (+2.8 percent). Finally, the sign of the estimate on visits per week is sensitive to the control variables included in the model, reversing direction when agency characteristics were added.

Given the anomalies, we conclude that the estimated treatment-control differences are probably not due to the effects of prospective payment. They are more likely to result from failure of the regression models to accurately reflect the true effect of observed preexisting differences on outcome measures or unmeasured predemonstration differences between treatment and control agencies or their patients.

**Agency Revenues and Surplus**

We also found no evidence that agencies increased their revenues or probability of

generating a surplus (equivalently, a profit for the for-profit agencies) as a result of the demonstration. This finding is not surprising, given the absence of any demonstration effects on costs.

The overall pattern observed during the 4-year period examined is one of change and uncertainty. Revenues increased rapidly during the predemonstration period, and about one-half of the 41 non-hospital-based agencies lost money on their overall (combined Medicare and non-Medicare) operations during that period. (Hospital-based agencies do not report revenues separately for their home health business; therefore, they were excluded from this analysis.)

Prospective ratesetting does not appear to have induced treatment agencies to change the mix of their Medicare and non-Medicare business during the first demonstration year. The regression-adjusted mean

**Table 5**  
**Impacts on Agency Surpluses From Medicare Home Health Visits, by Outcome**

Outcome	Unadjusted Treatment Group Mean	Estimated Impact of per Visit Ratesetting
Agencies Earning a Surplus on Medicare Home Health Visits (Percent)	48.1	<sup>1</sup> 19.0 (1.28)
Surplus as a Percent of Revenue	-6.6	-2.3 (-0.36)
Surplus per Medicare Home Health Visit	-\$6.5	-\$3.2 (-0.67)

<sup>1</sup>This estimate is the average difference between two predicted probabilities calculated for each individual from a logit model, one treating the individual as a treatment group member and the other treating the individual as a control group member. The *t*-statistic pertains to the coefficient on the treatment status variable in the logit model.

NOTES: Numbers in parentheses are *t*-statistics. Control agencies did not earn surpluses from Medicare home health visits. However, we have adjusted their base-year per-visit costs for inflation and change in volume to estimate the per-visit rates they would have received if they had been paid prospectively according to the procedures used to pay treatment agencies and then computed their hypothetical revenues and surpluses under these rates.

SOURCE: Authors' calculations from Medicare Cost Reports from 48 agencies (27 treatment and 21 control) for the first demonstration year.

proportion of visits paid for by Medicare is 62 percent for the control group, compared with 64 percent for the treatment group.

Although both treatment and control agencies fared somewhat better during the first demonstration year than during the preceding years, more than one-third of all agencies lost money on their overall operations during that year. Controlling for agency and area characteristics, logit analysis indicates that control agencies were slightly more likely to have generated an overall surplus (70 percent, compared with 59 percent for treatment agencies), but the difference was not statistically significant. Because HHAs cannot generate a surplus on Medicare-covered visits under the current cost-reimbursement system, any surplus realized by control agencies during the demonstration period (and by all agencies during the predemonstration period) came solely from their non-Medicare business and other sources of income.

As Table 5 indicates, treatment agencies may have been somewhat more likely than control agencies to reduce their costs relative to their predemonstration level, after adjustment for inflation and any change in the volume of visits rendered.<sup>6</sup> Controlling for agency and area characteristics, logit

analysis indicates that about one-half (48 percent) of the treatment agencies generated surpluses on their Medicare business by holding per visit costs below their adjusted base-year rates, whereas only 29 percent of the control agencies did so. (This difference is statistically significant at the 0.10 level.) The ratio of demonstration costs to adjusted base-year costs, however, was much more variable for treatment agencies. Also, as described above, we found that the control agencies were more likely to have overall surpluses, and that prospective ratesetting did not reduce per visit costs significantly. Taken together, these results suggest that treatment agencies may have been somewhat successful in holding cost increases for their Medicare operations below those experienced by control agencies, but the difference, if any, was slight.

### Patient Selection and Retention

Although financial incentives exist for treatment agencies to avoid serving or to drop patients who are particularly costly to

<sup>6</sup>We adjusted the base-year per visit costs of control agencies for inflation and change in volume under the procedures applied to the treatment group.

serve, we found no compelling evidence of these behaviors. This issue is of particular importance to those considering national conversion to prospective ratesetting, because such behaviors could result in restricted access to home care services for certain types of patients and to greater use of and costs for other health care services, including hospitals and skilled nursing facilities.

We examined the issue of program effects on agencies' selection and retention of patients by comparing the characteristics of patients in the treatment and control agencies. Using logit analysis for the binary dependent variables and ordinary least squares for the continuous variables, each of a series of patient characteristics was regressed on treatment status, controlling for predemonstration agency and area characteristics. The patient characteristics were those associated with the severity of patient condition and with diagnoses likely to require home health visits that are longer (more expensive) or shorter than average. Controlling for predemonstration agency and area characteristics, we also estimated the impact of per visit ratesetting on the number of visits per episode for subgroups of patients having characteristics associated with long visits. We also compared the regression-adjusted proportions of patients who were transferred and who resided in areas that were expensive to serve because the agencies considered them unsafe and provided escorts for staff.

As Table 6 indicates, we found a number of statistically significant differences between the treatment and control groups with respect to patient characteristics. The differences were often small in magnitude, however, and did not always indicate that treatment agencies were more likely than control agencies to avoid high-cost patients.

On the one hand, treatment-agency patients were significantly less likely than control-agency patients to have had various types of functional impairments and comorbidities at the beginning of their home health episode. On the other hand, treatment-agency patients were less likely to be clinically stable and to have caregivers.

We found no convincing evidence that patients admitted to treatment agencies were less likely than those admitted to control agencies to require treatments typically associated with long home health care visits.<sup>7</sup> The treatment-control difference was statistically significant for only one of the nine variables examined (intravenous therapy). Furthermore, after controlling for predemonstration agency and area characteristics, we found no treatment-control difference in the number of visits per episode delivered to those patients requiring any of the treatments typically associated with expensive home health visits. Treatment-agency patients were also no more likely than control-agency patients to be transferred to another HHA or to reside in unsafe areas. Thus, we found no evidence that the program incentives induced treatment agencies to "dump" patients who were expensive to serve.

### Quality of Care

We found no evidence that the treatment agencies altered their behavior in ways that affect the quality of home health care. Although demonstration incentives could induce agencies to make changes (for example, to reduce the length of visits or amount of supervisor time), such changes, if they occurred, did not result in poorer

<sup>7</sup>The patient characteristics associated with the need for long visits are: daily intravenous/infusion therapy planned, administration of intravenous therapy, diagnosis of serious cancer, diagnosis of complicated wounds, diagnosis of decubiti, terminal illness noted at admission, and decreased within 90 days of admission.

**Table 6**  
**Differences in Characteristics of Patients at Admission, by Outcome**

Outcome	Unadjusted Treatment Group Mean	Estimated Treatment-Control Difference <sup>1</sup>
<b>Functioning</b>		Percent
Eating/Tube Feeding	40.5	-9.5 **(-7.50)
Transfer	62.9	-9.2 **(-7.73)
Toileting/Elimination	55.7	-9.4 **(-7.79)
Dressing	69.7	-7.8 **(-6.81)
Bathing	79.2	-7.4 **(-7.36)
Walking/Wheeling	72.6	-5.9 **(-5.37)
Urinary Incontinence	20.0	-1.5 (-1.52)
Bowel/Bladder Incontinence	15.1	-2.2 **(-2.60)
Impaired In Ambulation	74.8	1.1 (0.91)
Impaired in Endurance	86.2	-1.0 (-0.91)
<b>General Health Status</b>		
Preadmission Location (Percent)		
Home or Apartment	29.8	0.9 (0.80)
Nursing Home/Rehabilitation Hospital	7.7	-0.7 (-0.90)
Acute-Care Hospital	59.1	0.1 (0.08)
Other	2.6	0.2 (0.26)
Number of Hospitalizations in Previous 12 Months	1.6	0.0 (0.48)
Clinically Stable (Percent)	37.8	-4.1 **(-2.86)
One or More Comorbidities (Percent)	46.1	-6.9 **(-5.56)
Medicare Expenditures in Previous Year	\$17,473	-\$611 (-1.29)
<b>Informal Caregivers</b>		Percent
Caregivers Live in Home	64.4	2.1 (1.75)
No Visiting or Live-In Caregivers	17.0	2.0 *(2.13)
Informal/Self Medical Care Likely	74.8	-0.4 (-0.37)
Caregivers Available to Assume Personal Care	55.0	-2.7 *(-2.19)

\*Significantly different from zero at the .05 level, two-tailed test.

\*\*Significantly different from zero at the .01 level, two-tailed test.

<sup>1</sup>For binary dependent variables, this estimate is the average difference between two predicted probabilities calculated for each individual from a logit model, one treating the individual as a treatment group member and the other treating the individual as a control group member. The t-statistic pertains to the coefficient on the treatment status variable in the logit model.

NOTES: Numbers in parentheses are t-statistics. The sample size is 24,555 (18,402 treatment and 6,153 control) episodes.

SOURCE: Authors' calculations from the demonstration patient intake form, HCFA certification forms 485 and 486, and Medicare claims.

**Table 7**  
**Impacts on Quality Assurance Review Indicators, by Outcome**

Outcome	Unadjusted Treatment Group Mean	Estimated Impact of per Visit Ratesetting <sup>1</sup>
<b>Confirmed Quality Problem</b>		Percent
With the Potential for Significant Adverse Effect	3.9	0.5 (0.20)
Without the Potential for Significant Adverse Effect	36.6	-3.0 (-0.64)
<b>Screen Failure Regarding</b>		
Addressing All Documented Problems	17.7	0.8 (1.22)
Addressing All Acute Problems Immediately	4.4	3.9 *(2.00)
Delivery of All Prescribed Nursing or Therapy Services	30.5	3.1 (0.72)
Adequacy of Discharge Plan	4.4	-3.6 (-0.90)

\* Significantly different from zero at the .05 level, two-tailed test.

<sup>1</sup>These estimates are the average difference between two predicted probabilities for each individual estimated from a logit model, one treating the individual as a treatment group member and the other treating the individual as a control group member. The t-statistic pertains to the coefficient on the treatment status variable in the logit model.

NOTES: Numbers in parentheses are t-statistics. The sample size is 650 (407 treatment and 243 control) episodes.

SOURCE: Authors' calculations from New England Research Institute quality assurance review assessments, completed as of November 1992.

outcomes for patients of treatment agencies relative to those of control agencies. We also found no evidence that the incentive to increase visits led to improved quality of care by treatment agencies.

No differences between the treatment and control agencies were found in any of the agency structure or process characteristics that might be linked to quality of care. The 18 measures examined reflected nurses' workloads, hiring practices, training procedures, staff competency (based on a federally mandated test for home health aides), changes in care planning, amount of supervision, accreditation, and number of patient complaints. Because we had so few observations on these structure and process measures (44 agencies), this analysis was limited to comparison of treatment and control group means.

In our logit analysis of the six quality assurance review indicators, we observed only one statistically significant difference in quality problems. As Table 7 indicates, controlling for predemonstration agency, area, and patient characteristics, treatment

agencies were significantly more likely than control agencies to fail to address all acute problems immediately. However, we observed no significant difference on the key quality assurance variable examined—the existence of confirmed quality problems with the potential to affect patients adversely.<sup>8</sup>

Controlling for agency, area, and patient characteristics, we observed no differences between the patients of treatment and control agencies in our logit analysis of post-discharge patient outcome measures: death within 30 days, admitted to a hospital within 30 days for the same or any diagnosis, or readmitted to a HHA within 30 days for the same or any diagnosis.

### Use of Medicare-Covered Services

Treatment-agency patients received significantly fewer Medicare-covered services

<sup>8</sup>Only one episode, for a patient of a treatment agency, was found to have had a quality problem that actually had a significant adverse effect on the patient. In our analysis, this case is included with those with a problem with the potential to affect patients adversely.

Table 8

**Treatment-Control Differences in Use of and Reimbursement for Medicare Services During Home Health Episodes, by Outcome**

Outcome	Unadjusted Treatment Group Mean	Estimated Treatment-Control Difference
<b>Total Reimbursement</b>		
Part A	\$3,211	-\$193 (-1.23)
Part B	\$869	-\$61 (-1.00)
Total Medicare	\$4,080	-\$289 (-1.48)
<b>Inpatient Hospital Services</b>		
Number of Admissions	.26	-0.01 (-0.48)
Number of Days	1.8	-0.1 (-0.44)
<b>Home Health Services</b>		
Number of Visits	<sup>1</sup> 29.7	-10.9 **(-6.28)
Medicare Reimbursement	\$2,039	-\$233 *(-2.29)
<b>Emergency Outpatient Services</b>		
Number of Visits	.13	-0.02 (-1.21)
<b>Non-Emergency Outpatient Services</b>		
Number of Visits	.75	0.12 (1.81)
<b>Practitioner Services<sup>2</sup></b>		
Number of Visits	5.06	-1.07 **(-3.72)
<b>Durable Medical Equipment (DME)</b>		
Receipt of DME (Percent)	33.9	<sup>3</sup> -4.6 **(-3.80)
Medicare Reimbursement	\$105	-\$50 **(-3.91)
<b>Other Part B Services<sup>4</sup></b>		
Use of Services (Percent)	66.5	<sup>3</sup> -5.2 **(-4.02)
Medicare Reimbursement	\$272	\$13 (0.37)

\*Significantly different from zero at the .05 level, two-tailed test.

\*\*Significantly different from zero at the .01 level, two-tailed test.

<sup>1</sup>Differs from the mean number of visits per episode presented in Table 4. The two analyses rely on somewhat different samples and different sources of Medicare claims (the demonstration fiscal intermediary and the National Claims History file).

<sup>2</sup>Practitioner services include those delivered outside of home health care by physicians; physical, occupational, and speech therapists; certified nurse anesthetists; nurse midwives; psychologists; and social workers.

<sup>3</sup>These estimates are the average difference between two predicted probabilities for each individual from a logit model, one treating the individual as a treatment group member and the other treating the individual as a control group member. The *t*-statistic pertains to the coefficient on the treatment status variable in the logit model.

<sup>4</sup>Other Part B services include diagnostic laboratory and radiology services, supplies and devices, mental health services, drugs, radiation therapy, ambulance, pap smears, and mammograms.

NOTES: Numbers in parentheses are *t*-statistics. The sample size is 24,396 (18,298 treatment and 6,098 control) episodes.

SOURCE: Authors' calculations from Medicare claims data.

than did control-agency patients during their home health care episodes. Although this difference could have resulted from improvements in the quality of home care under the demonstration, our analysis of quality of care produced no evidence of

such an impact. We conclude that the observed difference in the use of Medicare-covered services is due to differences in the case mixes of the two groups of agencies (rather than a program impact), with the treatment agencies

having more acutely ill patients and the control agencies treating a higher proportion of chronically ill patients.

Using ordinary least squares or logit analysis and controlling for patient characteristics at home health admission and for predemonstration agency characteristics, we found no significant differences in overall Medicare reimbursements or in hospital use. We did find, however, that treatment-agency patients had significantly lower home health use (and costs), durable medical equipment use, practitioners' service use, and other Part B service costs during their home health care episodes (Table 8). Treatment-agency patients' shorter average length of episode partly explained these differences. When the utilization and cost measures for Medicare-covered services were expressed in terms of per day of episode, to standardize for this difference, we found that relative to control-agency patients, treatment-agency patients had higher Part A and Part B reimbursements per day of episode.

We conclude from this pattern of shorter episodes and higher cost per day and from the results of the analysis of patient characteristics at admission that treatment-agency patients were more likely than control-agency patients to have an acute problem (such as a broken limb) resulting in the need for a relatively brief home care episode, consisting mainly of nursing or therapy (rather than aide visits), until their recovery. Conversely, control-agency patients appear to have had more functional impairments, increasing their need for aide-intensive home health care over a longer period. This difference in care needs would account for the higher cost per day observed for treatment-agency patients, because aide visits, on average, cost only about one-third as much as nursing or therapy visits.

## LIMITATIONS AND IMPLICATIONS

The findings from this preliminary analysis are limited by the data. Only 47 agencies participated for the entire first year of the demonstration, and only data for the first year of the 3-year demonstration period were available for the study. With the limited number of agencies, there may well be important pre-existing differences between the treatment and control agencies, despite randomization, possibly leading to differences in outcome measures between the two groups that cannot be attributed to prospective ratesetting. Thus, we are more dependent on the statistical models to control for these differences than one might expect in a study with random assignment of participants. The small number of agencies also means that relatively few such variables can be used in the statistical models to account for the effects of these pre-existing differences, and that the parameters of the models cannot be estimated with a high level of precision. Furthermore, in addition to these potential biases in the estimates, one must recognize that there is very little statistical power to detect moderate-size effects of the demonstration on agency-level outcomes of interest, such as costs and profits. That is, even if prospective ratesetting did affect agencies' behavior, the effects would have to be fairly large in order to have a high probability of detecting them with our sample because of the natural variation across agencies. Having data for only the first year of the demonstration also limits the precision of our estimates; more important, prospective ratesetting may have impacts that do not occur or that are not reflected in our outcome measures until after the first year of the demonstration. It is also possible that the impact of per visit ratesetting may differ depending on the characteristics of agencies and patients.

For this preliminary analysis, we did not conduct subgroup analyses.

Despite these limitations, our results are reasonably consistent across the different study areas and with the results of our study of agency operations under the demonstration (Thornton et al., 1993). A finding of no demonstration impacts on costs is consistent with our interviews with participating HHAs, in which treatment agencies reported having made few modifications to their operations in response to the demonstration. Thus, we should see little or no impact on agencies' costs, on the quality of care, or on patient selection—and that is essentially what we observed. The lack of effects on quality of care, in turn, suggests that we should see no impacts on the use and costs of Medicare services by treatment-agency patients. Although we observed some differences, these appear to result from differences in the mix of patients served by treatment and control agencies, rather than from a program effect. We will re-investigate all of these issues in the final reports on the per visit home health evaluation, in which we will analyze data from all three demonstration years and will consider results for subgroups defined by agency and patient characteristics.

To date, our overall finding is that per visit prospective payment did not stimulate the expected responses. In addition to the limitations of the analysis discussed previously, several factors may explain this outcome (Thornton et al., 1993). First, the incentives of per visit ratesetting were diluted to some extent because the demonstration procedures were not entirely prospective: Volume adjustment was applied retrospectively and final per-visit rates could not be established until base-year cost reports could be audited, many months after agencies entered the demonstration. Second, the control agencies were also likely to be seeking ways to operate

more efficiently. The demonstration took place in a national policy environment that emphasizes the efficient production of health care, and where all HHAs look for ways to ease the paperwork burden on their staff. Third, the opportunity to reduce clinical costs is limited by the requirements for participation in the Medicare program, State regulations, accrediting bodies, the demands of referral sources, and the professional standards of staff. Finally, agencies face incentives to control costs under cost reimbursement (particularly, the section 223 limits), which appears to have induced agencies to restrain cost increases. During the last decade, the increase in the average cost for a Medicare home health visit has been only marginally greater than the increases in the general Consumer Price Index.

Under per episode ratesetting, agencies will face stronger incentives to change their behavior than under per visit ratesetting and may have greater opportunity to do so. Reimbursed a fixed, predetermined amount for each episode of care rendered, agencies will face incentives to reduce the number of visits per episode, as well as cost per visit, perhaps giving them a greater opportunity than under per visit ratesetting to increase their operational efficiency and realize a financial advantage.

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