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The Influence of Medicare Home Health Payment Incentives: Does Payer Source Matter?

ABSTRACT. During the late 1990s, an interim payment system (IPS) was instituted to constrain Medicare home health care expenditures. Previous research has largely focused on the implications of the IPS for Medicare patients, but our study broadens the analysis to consider patients with other payer sources. Using the National Home and Hospice Care Survey, we found similar effects of the IPS across payer types. Specifically, the IPS was associated with a decrease in access to care for the sickest patients, less agency assistance with activities of daily living, and shorter length-of-use. However, these changes did not translate into worse discharge outcomes.

Introduction

Prior to the Balanced Budget Act (BBA) of 1997, home health agencies were paid on the basis of their costs, up to pre-established per-visit limits. Under this system, agencies could enhance their revenues by providing a greater number of beneficiaries with additional visits. Over the period 1990 through 1997, Medicare home health expenditures grew annually at a rate of more than three times that of the rest of the Medicare program (U.S. General Accounting Office 2000). The number of home health care users per 1,000 beneficiaries increased from 57 to 109, and the average number of visits per user doubled from 36 to 73.

The 1997 BBA changed Medicare home health eligibility and coverage rules and reformed the payment methodology by instituting a prospective payment system (PPS) for home health care reimbursement (Komisar 2002). Implemented on October 1, 2000, Medicare pays home health agencies a set payment rate for each 60-day episode of care, regardless of the specific services delivered. While the PPS was being developed, the Centers for Medicare & Medicaid Services (CMS) instituted an interim payment system (IPS). The IPS was phased in beginning October 1997 with the start of each agency's cost reporting period, and it constrained agency reimbursement by reducing the per visit payment limit and introducing an annual per-beneficiary cap.[1]

Previous work has shown that the payment changes introduced in the IPS were associated with large decreases in Medicare utilization and expenditures (McCall et al. 2003b; Murkofsky et al. 2003). Specifically, there was a 22 percent decrease in the proportion of beneficiaries using home health services, a 39 percent decrease in the number of visits per user, and a 27 percent decrease in the length of use. Interestingly, the decrease in utilization under the IPS has not been

found to correspond to a decrease in patient outcomes, including functioning, mortality, use of hospital and emergency care or patient satisfaction (McCall et al. 2003a, 2004).

However, there has been relatively little research addressing whether the changes under the IPS had implications for other payer groups. Because Medicare is the dominant payer of services, the payment changes introduced under the IPS may have affected the care of home health patients with other payer sources. We explore legal, economic and behavioral explanations below for why an agency may value treating all patients according to the same criteria. Alternatively, the decreased generosity of Medicare under the IPS may have led to the increased utilization of non-Medicare services if payer sources such as Medicaid and private insurance function as potential substitutes for Medicare.

Given the potential implications of the IPS for non-Medicare home health patients, the omission of these patients from prior analyses may yield misleading policy implications. Using a national survey of current and discharged home health patients, our study examines the implications of the IPS for the entire home health care sector.

Conceptual Framework

We hypothesize that the IPS provided strong economic incentives to home health agencies towards the care of Medicare patients. Specifically, we posit that the IPS had implications for access to care for the sickest patients, the intensity of services delivered, the length of use and the outcome at the time of discharge. We present hypotheses regarding the effect of the IPS on each of these outcomes for Medicare patients before turning to the potential implications for non-Medicare patients.

A primary policy concern under the IPS was access to home health care, particularly for the sickest beneficiaries requiring the most costly medical care (U.S. General Accounting Office

1998; U.S. Office of Inspector General 1999). Because of the tighter per-visit limit and the introduction of the per-beneficiary cap, agencies had a strong incentive to accept healthier Medicare patients needing fewer resources. Indeed, a Medicare Payment Advisory Commission (MedPAC) sponsored survey indicated that some agencies were no longer taking patients they previously would have admitted (Medicare Payment Advisory Commission 1999). Specifically, the survey suggested that long-term or chronic care patients were less likely to be admitted by these agencies as a result of the IPS. Thus, we predict that the IPS decreased access for those sickest home health care patients.

Once patients were admitted, there was an incentive under the IPS to provide fewer services, because the marginal revenue associated with the provision of additional services had decreased. Once again, the results of the MedPAC (1999) survey suggested that certain agencies responded to the IPS by providing fewer services per user relative to the pre-IPS period. Thus, we predict that home health agencies provided fewer services to Medicare patients under the IPS.

Similarly, the payment cap under the IPS entailed that the marginal revenue associated with additional days of care was also lower, providing an incentive to discharge Medicare patients earlier. Thus, we hypothesize that the IPS was associated with a decreased length of use among Medicare patients. Finally, depending on the marginal productivity of the home health services eliminated under the IPS, there may be implications of the policy change for patient discharge status. Assessing whether additional home health services are productive is difficult because there are no agreed-upon standards of what constitutes necessary or appropriate home health care, patients have chronic and overlapping care needs, and even the most basic unit of service—the visit—is not specifically defined (U.S. General Accounting Office 2000). Nevertheless, if the IPS eliminates productive home health care services, then we would expect

higher mortality, more discharges to an institutional setting and fewer discharges after the goals of care have been met. Alternatively, if the services cut under the IPS were not productive, then we would not expect a change in discharge status.

The implications of the IPS for other payer groups are less straightforward. Importantly, nearly all home health agencies are certified to care for Medicare and Medicaid patients (National Center for Health Statistics 2004). Although there is some specialization by payer type, most agencies care for a patient population covered by a variety of payer sources. Medicare is the dominant payer of services accounting for just over half of all home health care patients; Medicaid, private insurance and other payers cover the remaining patients. Every state Medicaid program is mandated to offer home health services to individuals who qualify for federal income maintenance payments (e.g., Social Security Income and Aid to Families with Dependent Children) and individuals who are "categorically needy." Services must include visits by registered nurses, credentialed home health aide services and medical supplies and equipment. In addition, states may choose to cover physical, occupational, and speech therapies and audiology services. States reimburse agencies using various methodologies including fee-for-service, prospective and cost-based methodologies (Kaiser Family Foundation 2004). As of October 2004, only a handful of state Medicaid programs had adopted home health care payment systems that mirrored the Medicare system.

There are multiple sources of private insurance coverage for home health care. Commercial health care plans such as Blue Cross and Blue Shield generally pay for skilled professional home health care services with some cost-sharing provisions. Managed care organizations and other group health plans often include coverage for home health care. Other sources of private insurance for home health care services include Medigap policies and long-

term care insurance. Finally, some individuals pay for services out-of-pocket based on a negotiated fee between the patient and the provider. Other sources of home health care coverage include state and local service programs through the Veterans Administration, the Older Americans Act, social services block grant programs, community organizations, the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), and worker's compensation.

Depending on the interrelationship among the various payer types, the IPS may have had implications for the care of non-Medicare patients. First, there are potential legal, behavioral, and economic explanations for why the IPS may have had similar implications for Medicare and non-Medicare patients. From a legal perspective, providers certified to accept Medicaid or Medicare patients are often required by the CMS to provide care of equal quality to all patients, regardless of payer type or generosity. However, monitoring and enforcing this uniform quality constraint may be quite difficult. From a behavioral perspective, there is a long-standing notion that professional norms matter in health care (Arrow 1963). Behavioral constructs such as trust, fairness and regret may explain why providers value treating all patients according to the same criteria (Frank 2004). From an economic perspective, certain aspects of health care are produced jointly for all payer types and may exhibit economies of joint production. For example, an agency's investment in staff training or administrative capacity would benefit all payer types.

Alternatively, there are reasons to suspect that other payer groups may serve as potential substitutes for Medicare-financed home health care. The underlying motivation for this substitution may occur at the patient, agency or government level. From the individual's perspective, a decrease in Medicare benefits under the IPS might lead a patient to seek alternative coverage from other public or private sources. From an agency's perspective, the

decrease in the generosity of Medicare payment under the IPS would make other payer groups relatively more attractive. From the government perspective, state Medicaid programs are thought to employ a "Medicare maximization" strategy whereby Medicaid is the public payer of last resort among dual eligibles (Wiener, and Stevenson 1998). In a survey of State Units on Aging and Medicaid departments conducted in 1998, three-quarters of the states responded that Medicare funding of home health care was maximized (Murtaugh et al. 1999). If Medicare is indeed maximized, then a decrease in Medicare payment generosity under the IPS may cause case workers to direct the dual eligible population towards Medicaid.

Finally, the care of non-Medicare and Medicare home health care patients may be unrelated. Unlike hospitals or nursing homes, home health care is not based in a common institutional setting and spillovers across patients of different payer types may be minimal. If this is the case, then the IPS should not have affected the care of non-Medicare patients.

Some previous research on the interdependence of different funding sources for home health care has found a negative relationship between Medicare and Medicaid home health care use at the state-level (Cohen, and Tumlinson 1997; Kenney, Rajan, and Soscia 1998; Liu, Wissoker, and Rimes 1998). We are aware of only one previous study that examined this issue in the context of the IPS (Han et al. 2004). In this study, the length of home health care use for Medicaid or privately insurance patients did not change under the IPS, suggesting that the care of Medicare and non-Medicare patients is not related. We build on this earlier work by considering the effect of the IPS for different payer groups over a range of outcomes.

Data and Methods

Our study used the 1994, 1996, 1998 and 2000 waves of the National Home and Hospice Care Survey (NHHCS), a nationally representative survey of home and hospice care agencies

and their current and discharged patients conducted by the National Center for Health Statistics. The data were collected using a two-stage sampling process. In the first stage, agencies were randomly selected (by size) from 24 strata according to agency-type (home health, hospice, or mixed), region (Northeast, Midwest, West or South), and location in a metropolitan statistical area. An interviewer contacted the administrator (or designee) for each sampled agency and collected general information on the agency. In the second stage of the sampling process, up to 6 current and 6 discharged patients were randomly chosen from each of the selected agencies. Patient-level data were obtained via personal interviews with the agency staff member who was most familiar with the patient's care along with a review of the patient records, if necessary. We excluded all hospice patients, thus the final samples included 17,029 current and 15,885 discharged home health patients.

To investigate the hypotheses outlined in the previous section, we examine two outcomes among current home health enrollees: level of illness at the time of admission and service intensity use, and two outcomes among discharged patients: length of use and discharge status. From the NHHCS current patient file, we used a list of up to 6 admission diagnoses to calculate a Charlson comorbidity score based on the presence of one or more of 18 chronic medical conditions; this score is associated with increased mortality (Charlson et al. 1987). Because we are ultimately interested in agency behavior towards those sickest patients and because nearly half of patients had a Charlson score of 0, we established a "high" Charlson category based on whether the individual had a score of 2 or more.

To model service intensity, we constructed a measure of the number of activities of daily living (ADLs) for which the patient received some help from the agency. The six ADL categories were bathing, dressing, eating, transferring in or out of beds or chairs, walking and

toileting. Because we are interested in those high service utilization patients, we dichotomized this outcome by categorizing patients that received help with 4 or more ADLs.

Among discharged patients, length of use was defined as the number of days from admission to discharge. Given the skewed nature of length of use, we constructed dummy variables measuring discharge within 30 days and discharge within 60 days (Han et al. 2004). Finally, we modeled the reason for discharge using four mutually exclusive categories: goals met, transfer to an inpatient care setting, death and other. The goals met category consists of recovery, stabilization, family and friends resuming care, and services no longer being needed. Inpatient care settings include both hospitals and nursing homes. The other category consists of those sample persons that were no longer eligible for services, were transferred to some other outpatient care setting or moved out of the area.

We constructed four primary payer categories: Medicare, Medicaid, private insurance and other payer. The other payer category consisted of the following categories: other governmental assistance, out-of-pocket, supplemental security income, religious organizations, Veterans Administration, CHAMPVA/CHAMPUS, other military medicine, and other. An IPS dummy is the key policy variable of interest. Because the IPS was implemented on October 1, 1997, data from the 1994 and 1996 waves were assigned to the pre-IPS period and data from the 1998 and 2000 waves were assigned to the post-IPS period. One potential issue with this assignment for the 1998 NHHCS wave is that patients may have been admitted in the period preceding the IPS (e.g., approximately 18% of Medicare home health patients in the 1998 wave were admitted prior to October 1, 1997 (Han, and Remsburg 2003)). Unfortunately, we are not able to correct for this issue using the public use NHHCS files, but if anything, this would bias our results toward finding no effect of the IPS.

A number of covariates were included in our multivariate models (see Table 1 for descriptive statistics). At the person-level, demographic variables included gender, age, race, ethnicity, and marital status. We also included the patient's referral source (physician, hospital, self/family, nursing home, or other), living arrangement (lives alone, institution, or other), and presence of a primary caregiver. At the agency level, we controlled for whether the agency was for-profit, group-owned, and hospital-based. Finally, we included dummy variables for whether the agency was located in a metropolitan statistical area and region of the country (Northeast, Midwest, West or South). For race, marital status and the agency-level variables, we also included dummy variables for missing observations to maximize our sample size. In the discharge analyses, we included dummy variables for the Charlson score, vision difficulty, hearing difficulty, and length of use (in modeling discharge destination).

INSERT TABLE 1 HERE

The empirical models exploit the panel nature of the NHHCS data to examine the implications of the IPS. The initial specification replicates earlier work by conditioning on those individuals with Medicare as the primary payer source. We estimate models of the following form:

$$Y_{it} = IPS_t\gamma + X_{it}\beta + \varepsilon_{it} \quad (1)$$

where Y_{it} refers to the outcome measure for patient *i* at time *t*, $\mathbf{X}_{it}$ includes an intercept and a set of patient and agency level controls, and ε_{it} is the error term. IPS is a dummy variable measuring those patients surveyed in the 1998 and 2000 waves. Thus, the basic identification strategy implicit in Equation (1) relies on comparing outcomes for Medicare patients before and after the implementation of the IPS. In order to directly test whether the IPS had implications for non-Medicare patients, we re-estimate equation 1 conditional on Medicaid, private insurance and

other payer. The estimates from this model provide information on whether the outcomes of interest have changed for other payer groups in the IPS period.

We analyze whether the implications of the IPS differed for Medicare patients relative to non-Medicare patients. Thus, we estimate the following model containing data from all four payer groups:

$$Y_{it} = IPS_t \times Medicare_{it}\alpha + IPS_t\gamma + Medicare_{it}\delta + Private_{it}\phi + Other_{it}\lambda + X_{it}\beta + \varepsilon_{it} \quad (2)$$

where we include an interaction of the IPS and Medicare variables. The interaction term is the key coefficient of interest in this model, allowing us to construct a "differences in differences" estimate. Basically, we compare the pre/post difference in outcomes for Medicare patients relative to the pre/post difference for non-Medicare patients. The failure to observe significant differences across payer types under the IPS would be consistent with the idea that the decrease in payment generosity under the IPS had similar implications for Medicare and non-Medicare patients.

Given the binary nature of the outcomes, these models are estimated as probits, but the coefficients are presented as marginal probability effects. Thus, the coefficient estimates can be interpreted as the percentage point change in the dependent variable following the adoption of the IPS. Given the complex survey design, the svy commands in STATA software (version 8.02) were used to incorporate the NHHCS weights to account for the unequal probability selection of patients and also correct the standard errors for clustering within agencies. Because strata were not included on the NHHCS public use file, we constructed this measure using the agency type, region and metropolitan statistical area variables (Carlson, Gallo, and Bradley 2004).

As a final methodological point, the interaction term in a probit model is not directly interpretable (Ai, and Norton 2003). Existing software to correct for this issue does not take

account of complex survey weights (Norton, Wang, and Ai 2004). Thus, we estimated Equation (2) above using a linear probability model. Once again, the coefficient estimates can be interpreted as the percentage point change in the dependent variable. In a set of robustness checks excluding the complex survey weights, these results were similar in magnitude and precision to the probit marginal probability estimates.

Results

Before examining the full multivariate estimates, we present unadjusted results documenting the outcomes of interest by payer type for the pre-IPS and IPS periods (see Table 2). With a few exceptions, trends in outcomes among Medicare and non-Medicare patients were similar over the two periods. For example, across all four payer groups, the proportion of patients discharged with the goals of care met increased in the IPS period. Similarly, both Medicare and non-Medicare patients were more likely to be discharged within 30 or 60 days in the IPS period. On the other hand, the proportion of patients receiving agency assistance for 4+ ADLs declined for Medicare and privately insured patients, increased for patients with other payer sources and remained relatively consistent for Medicaid patients. Overall, however, these descriptive results are suggestive of the idea that the IPS may have had similar implications for Medicare and non-Medicare patients.

INSERT TABLE 2 HERE

The first set of multivariate results examines the implications of the IPS for Medicare patients (see Table 3, column 1).[2] The first row explores the hypothesis that the IPS decreased access for those sickest patients. As expected, the adoption of the IPS was associated with a statistically significant ($p<0.05$) 3.9 percentage point decrease in the care of Medicare patients with a Charlson score of two or more. [3] The second row examines the relationship of the IPS and

the intensity of agency-provided services. The adoption of the IPS was significantly ($p<0.05$) related to a 4.4 percentage point decrease in agencies assisting patients with four or more activities of daily living. This finding is consistent with our hypothesis that the IPS decreased intensity of services, although an alternative explanation is that the trend towards admitting healthier patients resulted in fewer patients needing agency assistance with ADLs.

INSERT TABLE 3 HERE

The IPS was also hypothesized to result in a less favorable discharge from home health care. Thus, we expected an increased number of discharges to death or an institution and a decreased number of discharges in which the goals of care were met. However, the IPS was significantly ($p<0.05$) associated with a 1.4 percentage point decrease in deaths among Medicare patients, adjusting for other factors, including the Charlson score at admission. The other discharge outcomes were not statistically significant at conventional levels. Thus, there is no support for our hypothesis that patients experienced less favorable discharge outcomes under the IPS.

The final hypothesis regarding the IPS was that it would result in a shorter length of use for home health care patients. There is strong support for this hypothesis. Among Medicare patients, the IPS was significantly ($p<0.01$) associated with a 15.4 percentage point increase in patients with a length of use less than 30 days and a 15.9 percentage point increase in patients with a length of use less than 60 days.

We next examined the specific implications of the IPS for the Medicaid, privately insured and other payer groups. The Medicaid results (column 2) are particularly important given the potential substitution of Medicaid and Medicare services under the IPS. Interestingly, there is no indication of a substitution across Medicare and Medicaid patients. If anything, the Medicaid

results are generally similar to the Medicare results in terms of the direction and magnitude of the estimates. However, given the smaller sample size, the estimates were generally less precise with only two of the estimates achieving statistical significance. Among Medicaid patients, the IPS was associated with a 6.9 percentage point decline in discharge to institutions and 12.6 percentage point increase in individuals being discharged within 60 days.

The results for privately insured patients (column 3) are also quite similar to the Medicare results in terms of the direction and magnitude of the effects. Once again however, the standard errors are larger, which results in fewer statistically significant findings. Among privately insured patients however, the IPS was significantly associated with a decrease in agency assistance with 4+ ADLs, a decrease in discharge to death, an increase in discharge after the goals of care were met, and increased discharge within 30 and 60 days.

The other payer category (column 4) looks similar to Medicare in terms of length of use but different in the provision of services to individuals with 4 or more ADLs. Specifically, the IPS was significantly associated with a 25.5 percentage point increase in discharge by 30 days and a 15.4 percentage point increase in discharge by 60 days. The only other statistically significant result indicated that the IPS was associated with a 7.2 percentage point increase in agency assistance with patients for 4+ ADLs. The other results were not statistically significant.

The final set of results test whether the effects for Medicare patients under the IPS differ relative to non-Medicare patients (see Table 4). Once again, we construct this test by interacting Medicare status with the IPS dummy variable. The interaction terms are presented in column 1 along with the main effects (columns 2 and 3). Across the different outcomes, only the ADL and mortality models indicated statistically significant effects. In particular, Medicare patients were associated with a 5.1 percentage point decline in high ADL assistance and a 3.3 percentage point

decline in mortality under the IPS relative to non-Medicare patients. Although the other interaction terms were not significant, the large standard errors make it difficult to rule out a lack of precision in these estimates.

INSERT TABLE 4 HERE

Discussion

Across a range of outcomes, our results are suggestive of common effects under the IPS for Medicare and non-Medicare patients. These findings fit into a larger health services literature examining the treatment of patients with different payer sources in a common setting. Typically, this literature highlights the potential benefits of these arrangements for publicly-insured patients. For example, there is evidence that Medicaid patients receive higher quality care when cared for along side non-Medicaid patients in both hospitals (Dranove, and White 1998) and nursing homes (Grabowski, Angelelli, and Gruber 2005). In recognition of these spillovers, policymakers often encourage the integration of publicly-insured patients into mainstream medicine. Examples include the Veteran's Administration requirement that its hospitals be affiliated with a teaching hospital, and before it was recently repealed, CMS limiting Health Maintenance Organizations in the number of Medicare patients they could accept (Norton 2000).

Alternatively, this study highlights how a decrease in the generosity of public payment had similar effects among Medicare and non-Medicare home health patients. Specifically, the IPS was associated with a decrease in Medicare access for those sickest patients, a decline in patients receiving agency assistance with 4 or more ADLs, and a decrease in length-of-use. Only two outcomes—high ADL assistance and discharge to death—were associated with statistically significant differences across Medicare and non-Medicare patients. These results highlight the need to think broadly when evaluating policy changes. In the case of the IPS, focusing on

Medicare patients alone may have caused previous analyses of the IPS to underestimate the overall effects.

From a policy perspective, this observation can be used to help frame a welfare analysis of the IPS. Clearly, a full calculation of the welfare implications of the IPS is beyond the scope of this paper, but any budgetary savings generated from a decrease in utilization under the IPS must be weighed against any negative patient outcomes. As noted above, we found evidence that access to home health services declined for those sickest patients under the IPS. With our current data, it is not possible to assess the health implications for those individuals who did not receive home health care services during the IPS period. For those patients that did receive agency care however, our results indicate stable discharge outcomes under the IPS, even after accounting for the healthier mix of patients at admission. These findings are similar to earlier work showing no decline in patient quality under the IPS (McCall et al. 2003a, 2004). One interpretation of these results is that those services eliminated under the IPS may not have constituted beneficial services. Once again, there are not agreed-upon standards of what constitutes medically necessary or appropriate home health care services. In support of this point, the General Accounting Office (2000) has reported wide geographic variation in Medicare home health care utilization prior to the implementation of the IPS. For example, Medicare home health care users in Maryland received an average of 37 visits in 1997 while users in Louisiana received 161 visits. This variation in use, which persists after controlling for patient diagnoses, may suggest that the decrease in utilization under the IPS represented "flat of the curve" home health care, offering few additional benefits for patients.

Ultimately, this study highlights some potential welfare gains under the IPS, mainly lower utilization without a corresponding decline in patient discharge status, and a potential

welfare loss, worse access to services for those sickest patients. However, we still know relatively little about the marginal productivity of home health care services. Moving forward, additional data will be necessary to analyze this issue in the context of the Medicare home health care PPS currently in place.

Although we find evidence consistent with the idea that the IPS had implications for non-Medicare patients, we recognize the limitation that we cannot separate out the effects of the IPS from other factors that may have influenced home health care over this time period. That is, we may have misattributed the effects of some other policy or market change over this time period to the IPS. This could occur in one of two ways. First, it is possible that the over the same period that the IPS affected the care of Medicare patients, there were other policies or changes that had implications for privately insured, Medicaid and other patients. Alternatively, it is possible that the IPS had no effect for any of these payer groups and we are simply observing secular trends across all payer groups. Concurrent changes in the home health environment include Medicare antifraud initiatives, the removal of venipuncture as a qualifying service for Medicare home health eligibility, more stringent Medicare claims review and sequential billing policies, market forces affecting the supply of home health agency employees and technological changes in the delivery of services (Medicare Payment Advisory Commission 1999). The first three factors were targeted towards the Medicare population, and if anything, likely played a relatively minor role in the effects observed in this study. The final two factors—the supply of home health care workers and technological advances—would have implications for all home health care patients, but would not necessarily explain the changes observed under the IPS. Thus, although our study design cannot rule out these other factors, it is highly unlikely that they explain our current findings.

Another potential limitation associated with our study is the limited precision in some of our estimates. Given that roughly two-thirds of all home health patients are covered by Medicare, the nationally-representative NHHCS sample consists of relatively few non-Medicare observations. Another limitation of the dataset is the inability to disentangle agency effects given a maximum of 6 observations per agency. Agencies that care for predominantly Medicare patients should experience the effects of the IPS, while agencies with no Medicare patients should not. An alternative empirical strategy to the one utilized here would be to compare the implications of the IPS across high and low Medicare agencies. In an evaluation of the adoption of the Medicare PPS for skilled nursing facilities, Konetzka and colleagues (2004) employed this "differences-in-differences" approach in treating nursing home residents in low-Medicare nursing homes as a control for unobserved variation over time within the industry. With the NHHCS, we do not have a variable measuring agency payer mix. However, both of these data limitations—sample size and the lack of an agency payer mix variable—may be addressable in future work using the Outcome and Assessment Information Set (OASIS) data set, CMS-mandated assessments of all home health care patients at certified agencies.

In sum, our analyses indicate that the Medicare IPS for home health care services resulted in worse access for those sickest patients, a lower intensity of services, and decreased length of use. These findings hold for both Medicare and non-Medicare patients. Despite the decline in length-of-use, we did not observe significantly worse discharge outcomes even after controlling for health at the time of admission. This counterintuitive result could be explained by the fact that the utilization eliminated under the IPS may not have been medically necessary. Nevertheless, additional research is needed to understand outcomes for patients whose access to home health services has been affected.

NOTES

[1] Although the broad incentives under the Interim Payment System (IPS) are straightforward, the details of the payment policy are more complicated (Medicare Payment Advisory Commission, 1999). Prior to the Balanced Budget Act (BBA), Medicare reimbursed home health agencies based on their actual costs up to an aggregate limit, which was calculated by multiplying the national per-visit limit for each of six types of visits by the number of visits of each type provided by the agency. The national limit was set at 112 percent of the mean cost for each visit type. The BBA introduced two changes to this payment system. First, it added a per-beneficiary limit, which was 98 percent of the average per-beneficiary costs for each agency in fiscal year 1994 (and then adjusted for inflation to 1996-1998 dollars) and the average per-patient cost for agencies in the region. 75 percent of an agency's historical costs are blended with 25 percent of the median costs of agencies in the same region. The average per-beneficiary limit for agencies that were Medicare certified post-1994 was set at the national median for established agencies. Second, the BBA decreased the per-visit cost limits from 112 percent of the national mean cost per visit to 105 percent of the national median. Because the medians were less than the means, the reduction ended up exceeding 7 percent. For cost-reporting periods beginning in fiscal year 1998, Medicare paid agencies the lower of their actual costs, the aggregate per-beneficiary limit, or the aggregate per-visit limit. As a note, some minor changes were made to these rules over the course of the IPS.

[2] In the primary regression tables, we present only the coefficient estimates that explore our primary hypotheses. However, the full regression results for Table 1, column 1 are included as appendix Tables 1-3 and the remaining results are available upon request from the authors.

[3] For both the Charlson Score and activities of daily living measures, our results were robust to treating these outcomes as continuous measures.

Table 1: Variable means (constructed with survey weights)

	Current (N=17,029)	Discharged (N=14,885)
1994 wave	0.250	0.189
1996 wave	0.321	0.279
1998 wave	0.249	0.274
2000 wave	0.179	0.258
Medicare	0.602	0.657
Medicaid	0.174	0.104
Private Insurance	0.097	0.177
Other Payer	0.127	0.062
Control variables		
Female	0.666	0.625
Married	0.301	0.385
Marital status missing	0.127	0.124
African American	0.133	0.095
Other race	0.031	0.040
Race missing	0.159	0.177
Hispanic	0.041	0.046
Lives in Metropolitan Statistical Area	0.785	0.857
Region: West	0.121	0.167
Region: South	0.340	0.265
Region: Midwest	0.225	0.213
Region: Northeast	0.315	0.356
Age less than 65	0.281	0.305
Age 65-74	0.189	0.222
Age 75-84	0.317	0.306
Age 85+	0.213	0.168
Lives alone	0.323	0.261
Lives in an institution	0.078	0.069
Referral source: self/family	0.066	0.033
Referral source: hospital	0.329	0.470
Referral source: nursing home	0.026	0.024
Referral source: other	0.216	0.126
Has primary caregiver	0.740	0.791
Vision difficulty	--	0.175
Hearing difficulty	--	0.156
Charlson score = 0	--	0.466
Charlson score = 1	--	0.275
Charlson score = 2	--	0.177
Charlson score = 3	--	0.044
Charlson score = 4+	--	0.037
For profit agency	0.388	0.314
Ownership missing	0.027	0.013
Group-owned agency	0.451	0.457
Group-owned missing	0.040	0.039
Hospital-based agency	0.299	0.396
Hospital-based missing	0.041	0.034

Table 2: Outcome means by payer type and payment system (constructed with survey weights)

	Pre-Interim Payment System	Interim Payment System	Overall
	Charlson score of 2 or more		
All	0.27	0.24	0.26
Medicare	0.30	0.26	0.29
Medicaid	0.25	0.21	0.23
Private insurance	0.23	0.23	0.23
Other payers	0.18	0.18	0.18
	Agency assistance with 4 or more Activities of Daily Living		
All	0.24	0.23	0.23
Medicare	0.25	0.21	0.23
Medicaid	0.29	0.29	0.29
Private insurance	0.19	0.11	0.15
Other payers	0.15	0.32	0.22
	Discharged: Death		
All	0.06	0.03	0.04
Medicare	0.06	0.03	0.04
Medicaid	0.02	0.05	0.04
Private insurance	0.04	0.02	0.03
Other payers	0.10	0.03	0.07
	Discharged: Institution		
All	0.18	0.16	0.17
Medicare	0.20	0.19	0.20
Medicaid	0.17	0.12	0.15
Private insurance	0.12	0.07	0.09
Other payers	0.18	0.16	0.17
	Discharged: Goals met		
All	0.64	0.70	0.67
Medicare	0.62	0.67	0.65
Medicaid	0.66	0.69	0.68
Private insurance	0.77	0.85	0.81
Other payers	0.49	0.59	0.53
	Discharged: Other		
All	0.12	0.11	0.11
Medicare	0.11	0.11	0.11
Medicaid	0.15	0.13	0.14
Private insurance	0.08	0.07	0.07
Other payers	0.08	0.07	0.23

Table 2 (continued): Outcome means by payer type and payment system (constructed with survey weights)

	Pre-Interim Payment System	Interim Payment System	Overall
	Length of use less than 30 days		
All	0.38	0.54	0.47
Medicare	0.35	0.51	0.44
Medicaid	0.40	0.50	0.45
Private insurance	0.52	0.66	0.61
Other payers	0.36	0.61	0.47
	Length of use less than 60 days		
All	0.65	0.79	0.73
Medicare	0.63	0.79	0.72
Medicaid	0.65	0.72	0.68
Private insurance	0.76	0.87	0.82
Other payers	0.56	0.70	0.62

Table 3: The implications of the interim payment system for home health care patients

Dependent variable	Medicare (1)	Medicaid (2)	Private Insurance (3)	Other Payer (4)
Currently enrolled home health patients				
Number of patients	9,983	2,898	1,617	2,486
Charlson score of 2 or more	-0.039**	-0.017	-0.007	0.007
	(0.016)	(0.029)	(0.038)	(0.032)
Agency assistance with 4 or more ADLs	-0.044**	-0.039	-0.051*	0.072*
	(0.019)	(0.035)	(0.028)	(0.040)
Discharged home health patients				
Number of patients	9,194	1,576	1,858	1,383
Discharged: death	-0.014**	0.008	-0.005*	-0.002
	(0.006)	(0.005)	(0.003)	(0.004)
Discharged: institution	-0.002	-0.069**	-0.013	0.008
	(0.018)	(0.032)	(0.016)	(0.029)
Discharged: goals met	0.009	0.058	0.054*	0.063
	(0.020)	(0.053)	(0.032)	(0.060)
Discharged: other	0.009	-0.001	-0.018	-0.033
	(0.012)	(0.022)	(0.017)	(0.050)
Number of patients	9,257	1,619	1,947	1,417
Length of use less than 30 days	0.154***	0.081	0.126***	0.255***
	(0.021)	(0.057)	(0.048)	(0.065)
Length of use less than 60 days	0.159***	0.126***	0.082***	0.154**
	(0.023)	(0.048)	(0.035)	(0.066)

Notes: Standard errors are presented in parentheses. All models include the variables detailed in Table 1.
ADLs=activities of daily living
*** = p<.01; ** = p< 0.05; * = p< 0.10

Table 4: Effect of the Interim Payment System (IPS) on Medicare relative to other payer groups

Dependent variable	IPS*Medicare	IPS	Medicare
Charlson Score of 2 or more (N=16,984)	-0.021 (0.028)	-0.018 (0.021)	0.080*** (0.026)
Agency assistance with 4+ ADLs (N=16,984)	-0.051* (0.029)	0.004 (0.025)	0.051** (0.023)
Discharged: death (N=14,107)	-0.033* (0.018)	0.013 (0.013)	-0.007 (0.032)
Discharged: institution (N=14,107)	0.024 (0.033)	-0.032 (0.027)	0.002 (0.031)
Discharged: goals met (N=14,107)	-0.014 (0.035)	0.030 (0.030)	0.122*** (0.047)
Discharged: other (N=14,107)	0.023 (0.024)	-0.011 (0.020)	-0.117*** (0.042)
Length of use < 30 days (N=14,240)	0.044 (0.047)	0.115*** (0.047)	-0.058 (0.064)
Length of use < 60 days (N=14,240)	0.061 (0.044)	0.089*** (0.033)	0.052 (0.065)

Notes: Standard errors are presented in parentheses. All models include the control variables detailed in Table 1.
ADLs=activities of daily living
*** = p<.01; ** = p< 0.05; * = p< 0.10

Appendix Table 1: Full Medicare regression results: Current Patients

	High Charlson	High ADL
IPS (post-1997)	-0.039 (0.016)	-0.044 (0.019)
Female	-0.047 (0.018)	0.017 (0.016)
Married	0.009 (0.021)	0.026 (0.018)
Marital status missing	-0.045 (0.025)	0.014 (0.027)
African American	0.024 (0.030)	-0.009 (0.023)
Other race	-0.069 (0.044)	0.081 (0.073)
Race missing	-0.044 (0.026)	-0.017 (0.026)
Hispanic	0.079 (0.048)	0.063 (0.043)
Lives in MSA	-0.010 (0.018)	0.023 (0.019)
Region: West	0.018 (0.028)	-0.059 (0.027)
Region: South	-0.012 (0.024)	0.027 (0.026)
Region: Midwest	0.009 (0.025)	-0.065 (0.025)
Age 65-74	0.027 (0.036)	0.047 (0.030)
Age 75-84	-0.007 (0.035)	0.055 (0.025)
Age 85+	-0.067 (0.037)	0.121 (0.029)
Lives alone	0.015 (0.022)	-0.024 (0.019)
Lives in an institution	-0.035 (0.032)	-0.096 (0.024)
Referral source: self/family	0.030 (0.040)	0.037 (0.027)
Referral source: hospital	0.042 (0.021)	-0.032 (0.020)
Referral source: nursing home	0.007 (0.049)	0.012 (0.037)
Referral source: other	0.003 (0.026)	0.055 (0.026)
Has primary caregiver	0.025 (0.030)	0.059 (0.020)
For profit agency	-0.012 (0.019)	0.044 (0.021)
Ownership missing	-0.035 (0.031)	-0.087 (0.032)
Group-owned agency	-0.023 (0.017)	-0.042 (0.019)
Group-owned missing	0.016 (0.048)	-0.045 (0.054)
Hospital-based agency	-0.008 (0.017)	-0.015 (0.019)
Hospital-based missing	0.028 (0.072)	0.155 (0.101)
N	9,983	9,983

Appendix Table 2: Full Medicare regression results: Discharged destination

	Death	Institution	Goals Met	Other
IPS (post-1997)	-0.014 (0.006)	-0.002 (0.018)	0.009 (0.020)	0.009 (0.012)
Female	-0.017 (0.007)	-0.013 (0.017)	0.056 (0.022)	-0.021 (0.014)
Married	-0.011 (0.006)	0.021 (0.023)	0.011 (0.026)	-0.013 (0.016)
Marital status missing	-0.001 (0.010)	-0.022 (0.028)	0.030 (0.036)	-0.003 (0.021)
African American	-0.010 (0.006)	0.001 (0.029)	-0.004 (0.035)	0.013 (0.019)
Other race	-0.017 (0.006)	-0.022 (0.038)	0.048 (0.046)	0.003 (0.031)
Race missing	0.029 (0.020)	-0.012 (0.021)	-0.039 (0.038)	0.004 (0.015)
Hispanic	-0.011 (0.008)	-0.088 (0.028)	0.154 (0.041)	-0.036 (0.026)
Lives in MSA	-0.016 (0.006)	0.002 (0.016)	0.006 (0.021)	0.011 (0.010)
Region: West	0.012 (0.011)	-0.068 (0.022)	0.045 (0.029)	0.028 (0.023)
Region: South	0.013 (0.009)	-0.042 (0.024)	-0.004 (0.030)	0.044 (0.023)
Region: Midwest	0.004 (0.007)	-0.060 (0.022)	0.036 (0.028)	0.038 (0.025)
Age 65-74	0.014 (0.012)	-0.050 (0.030)	0.041 (0.044)	-0.005 (0.019)
Age 75-84	0.040 (0.014)	-0.019 (0.032)	0.008 (0.048)	-0.031 (0.020)
Age 85+	0.047 (0.017)	0.032 (0.035)	-0.038 (0.049)	-0.032 (0.019)
Lives alone	-0.022 (0.005)	0.018 (0.026)	0.020 (0.028)	-0.004 (0.014)
Lives in an institution	-0.002 (0.011)	0.057 (0.029)	-0.041 (0.036)	-0.007 (0.020)
Referral: self/family	-0.005 (0.015)	-0.015 (0.048)	0.033 (0.087)	-0.007 (0.025)
Referral: hospital	-0.010 (0.006)	-0.004 (0.020)	0.036 (0.025)	-0.019 (0.013)
Referral: nursing home	-0.013 (0.008)	0.030 (0.050)	-0.042 (0.064)	0.023 (0.039)
Referral: other	0.025 (0.021)	-0.050 (0.024)	0.018 (0.045)	-0.007 (0.019)
Has primary caregiver	0.0001 (0.008)	0.003 (0.026)	0.028 (0.031)	-0.023 (0.017)
For profit agency	-0.005 (0.006)	0.022 (0.021)	-0.042 (0.022)	0.025 (0.015)
Ownership missing	-0.001 (0.008)	-0.030 (0.043)	-0.035 (0.065)	0.059 (0.031)
Group-owned agency	0.004 (0.005)	0.001 (0.018)	-0.016 (0.021)	0.007 (0.013)
Group-owned missing	-0.010 (0.011)	-0.038 (0.029)	0.016 (0.055)	0.034 (0.054)
Hospital-based agency	-0.005 (0.005)	-0.008 (0.019)	0.005 (0.022)	0.011 (0.015)
Hospital-based missing	-0.012 (0.008)	0.060 (0.053)	0.021 (0.051)	-0.043 (0.024)
Charlson score = 1	0.004 (0.009)	0.071 (0.021)	-0.086 (0.026)	0.014 (0.0.14)
Charlson score = 2	0.030 (0.017)	0.084 (0.028)	-0.095 (0.042)	-0.011 (0.016)
Charlson score = 3	0.025 (0.016)	0.156 (0.043)	-0.154 (0.048)	-0.008 (0.021)
Charlson score = 4+	0.051 (0.022)	0.336 (0.063)	-0.337 (0.056)	-0.029 (0.017)
Difficulty seeing	0.013 (0.007)	0.039 (0.021)	-0.044 (0.022)	-0.013 (0.012)
Difficulty hearing	0.004 (0.006)	0.015 (0.019)	-0.055 (0.024)	0.035 (0.015)
Length of use 30-59 days	0.0003 (0.007)	-0.064 (0.017)	0.090 (0.023)	-0.025 (0.015)
Length of use 60-99 days	0.002 (0.007)	-0.028 (0.025)	0.064 (0.032)	-0.035 (0.014)
Length of use > 100 days	0.039 (0.015)	0.082 (0.027)	-0.178 (0.027)	0.031 (0.020)
N	9,194	9,194	9,194	9,194

Appendix Table 3: Full Medicare regression results: length of use (in days)

	Length of use <30	Length of use <60
IPS (post-1997)	0.154 (0.021)	0.159 (0.023)
Female	-0.014 (0.027)	-0.025 (0.018)
Married	0.026 (0.035)	0.008 (0.036)
Marital status missing	0.001 (0.042)	0.024 (0.036)
African American	-0.031 (0.033)	-0.042 (0.027)
Other race	-0.066 (0.059)	-0.071 (0.065)
Race missing	-0.010 (0.032)	-0.002 (0.033)
Hispanic	0.082 (0.062)	0.090 (0.037)
Lives in MSA	0.077 (0.019)	0.090 (0.019)
Region: West	0.005 (0.038)	0.049 (0.041)
Region: South	-0.097 (0.033)	-0.092 (0.035)
Region: Midwest	-0.156 (0.032)	-0.009 (0.038)
Age 65-74	-0.046 (0.038)	0.015 (0.036)
Age 75-84	-0.072 (0.035)	-0.010 (0.031)
Age 85+	-0.101 (0.041)	-0.062 (0.042)
Lives alone	0.034 (0.032)	0.021 (0.029)
Lives in an institution	-0.014 (0.037)	0.010 (0.034)
Referral source: self/family	-0.154 (0.047)	-0.211 (0.066)
Referral source: hospital	0.026 (0.025)	0.024 (0.020)
Referral source: nursing home	0.075 (0.064)	0.014 (0.048)
Referral source: other	-0.020 (0.042)	-0.020 (0.041)
Has primary caregiver	0.015 (0.029)	-0.023 (0.024)
For profit agency	-0.034 (0.027)	-0.028 (0.027)
Ownership missing	-0.080 (0.042)	0.036 (0.042)
Group-owned agency	0.059 (0.025)	0.032 (0.025)
Group-owned missing	0.108 (0.044)	0.073 (0.058)
Hospital-based agency	0.086 (0.024)	0.040 (0.024)
Hospital-based missing	0.030 (0.051)	-0.040 (0.060)
Charlson score = 1	-0.058 (0.027)	-0.061 (0.022)
Charlson score = 2	-0.93 (0.029)	-0.094 (0.032)
Charlson score = 3	-0.107 (0.044)	-0.105 (0.039)
Charlson score = 4+	-0.075 (0.053)	-0.063 (0.062)
Difficulty seeing	-0.027 (0.025)	-0.017 (0.020)
Difficulty hearing	0.034 (0.028)	0.005 (0.022)
N	9,257	9,257

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