The Medicare Hospice Payment System: A Preliminary Consideration of Potential Refinements

A study conducted by staff from Rand Health for the Medicare Payment Advisory Commission

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HEALTH

Abstract

Recent changes in the patient population and provision of care have generated interest in re-evaluating Medicare's per diem payment system for hospice. Given the limitations of the Medicare data with respect to patient-level resource utilization, we rely on visit data from a large national chain of hospice providers. The findings suggest that the hospice payment system reflects resource use and that available case mix adjusters would not substantially improve the system's performance. However, we also find that the per diem system could be adjusted to more accurately capture variation in costs within stays. Future data collection and analysis efforts should focus on more detailed and comprehensive measures of patient-level utilization and on patient characteristics that relate directly to necessary care.

Introduction

The Medicare payment system for hospice care has remained largely unchanged since per diem rates were instituted in 1983. The payment system was developed based on the results of a Health Care Financing Administration demonstration project conducted from 1980 to 1982. The demonstration included 26 hospices providing care to Medicare patients with terminal cancer. The resulting per diem rates vary based on four categories of care: routine home care, continuous home care, inpatient respite care, and general inpatient care. Payments are also adjusted using a local wage index.

During the past two decades, payment levels have been updated for inflation based on a market basket, but otherwise the payment methodology has remained largely unchanged. Unlike other Medicare payment systems, hospice payments are not adjusted for case mix, urban/rural location (apart from the wage index), costly outliers or other factors that could affect costs. There is increasing concern that the payment methodology no longer accurately reflects costs because of changes in provider, patient, and service characteristics (Huskamp, Buntin et al. 2001). This concern is compounded by the rapid expansion in the number of hospice providers, hospice use, and associated Medicare expenditures. Since 1992, the number of active providers has doubled, the number of beneficiaries has quadrupled, and Medicare expenditures have increased five-fold (MedPAC 2002; GAO 2004; MedPAC 2005). These developments have raised interest in potential adjustments to the current payment methodology (MedPAC 2002, MedPAC 2004). However, the limitations of Medicare data have undermined efforts to examine patient-level service utilization and costs and to understand how these factors, in turn, impact the appropriateness of the payment structure. Despite calls for additional data collection to support research efforts (GAO 2004), there is little evidence on what data might be useful in analyzing and adjusting the payment system.

Given the current per diem payment structure and the change in the hospice population over time, we focus on three specific questions related to potential refinements to the hospice payment system. These questions had been raised in earlier literature and in the Commission's June 2004 report (Buntin 2002; MedPAC 2004).

1. How well does the per diem system reflect current hospice resource use?
2. Should case mix adjustments be considered?
3. Are the beginnings and ends of hospice stays more intensive?

Background

Two recent developments – the increase in the share of non-cancer diagnoses among the hospice population and changes in care for cancer patients – raise concerns that the payment system may not track resources used to care for patients (GAO 2000a and b; GAO 2004). The share of hospice patients with cancer diagnoses has fallen considerably. In 1992, cancer patients comprised 75% of hospice patients (NCHS 2003). Ten years later, the share of hospice patients with cancer diagnoses declined to only 43%, while neurodegenerative, cerebrovascular, and cardiovascular diagnoses increased in prevalence (see Table 1). Research indicates that non-cancer hospice patients – such as those diagnosed with congestive heart failure, chronic obstructive pulmonary disease, Alzheimer's or stroke – differ in the intensity of services used, types of services, and length of stay (GAO 2002a and b; Campbell, Lynn et al. 2004). Patients with non-cancer diagnoses may also have different locations of care – such as differential use of nursing homes. Finally, these patients may also be older, implying an increased number of comorbidities and lower probability of a living partner. These factors can impact their service utilization and the costs of providing their care. Evidence suggests increasing use of more expensive elements of hospice care such as nursing services, social services, and durable medical equipment relative to less expensive elements such as home health aides (GAO 2004).

The second concern regarding the payment structure arises from changes in the treatment of cancer patients due to advances in medical technology such as new palliative drugs, chemotherapy, and radiation (GAO 2004). Advances in cancer treatments may alter the timing of entry into hospice as patients pursue curative treatment. Such changes can affect service utilization and the appropriateness of the payment structure by shortening the length of stay and increasing the average intensity of care during an episode. GAO (2004) found that the average length of stay decreased for cancer patients and for the four major non-cancer categories (e.g., stroke, congestive heart failure, chronic obstructive pulmonary disease, and Alzheimer's) between the 1980-82 demonstration and 2001.

While these issues have been recognized in the literature, Medicare data cannot provide complete information about their impact on service utilization and costs. Medicare claims record the number and type of days billed, but do not record the number of visits received, the length of those visits, the disciplines of the staff-members providing care, and the timing of visits during the patient's stay. Medicare data from facility cost reports record expenditures by category (e.g., staff, drugs), but these costs cannot be allocated to individual patients. Consequently, differences in service utilization and costs across diagnosis categories and variations in the intensity of care during a stay cannot be examined directly for the Medicare population. Policymakers have called for improved data collection to address these issues, but such efforts have not yet been undertaken (GAO 2004). Given these limitations, our analyses rely on a more detailed dataset collected by a large chain of freestanding hospice providers.

Data

The data for this study consist of patient-level demographics and diagnoses as well as visit-level data on service utilization from a major national chain hospice provider. The analyses focus on Medicare hospice patients who were admitted in 2002 and 2003. The resulting sample consists of 68,725 patients or about 6% of the Medicare hospice population. The dataset includes substantial detail on service utilization and patient demographics that are not available

in the Medicare data. Key service utilization variables include the exact date of each visit, the discipline of staff-members involved in each visit, the length of visits, and receipt of routine home care at a nursing home. Key demographics and case factors include primary diagnosis, age, race/ethnicity, gender, marital status/living arrangement, and discharge status.

The detailed data allow the construction of two measures of service utilization. The number of visits received by each patient is calculated by counting the number of visits received during a stay.[1] The second measure, visit labor costs, are the wages associated with providing the visits and are based on the number of visits, the length of visits, and the discipline of staff-members involved. These factors are converted into dollars using average hourly earnings for each discipline from the Bureau of Labor Statistics and adjusted for geographic location using the Medicare wage index. Visit labor costs capture only the direct wage costs of staff-member time spent with each patient. We estimate that these costs reflect approximately one-fifth of total facility costs per patient. The measure does not capture transportation time, administrative overhead, employee benefits, and the non-labor costs of providing care (e.g., drugs and medical supplies). While facility-level data were available on these elements of costs, it was not possible to allocate shares to particular patients based on individual resource use. A more comprehensive measure of costs would thus be useful, but visit labor costs are likely representative of the major component of variable costs because labor accounts for the majority of routine costs, indirect labor costs parallel direct costs to a sizable extent, and visit labor costs reflect patient needs and severity.

Analyses

The chain provider's patient population differs from the Medicare hospice population overall and also differs from the population in freestanding hospices (see Table 1).[2] The chain provider has significantly fewer cancer patients. Only one-third of Medicare patients at these facilities had a primary diagnosis of cancer compared to 43% among all hospices and 40% among freestanding hospices. In addition, the chain provider had a greater share of neurodegenerative, cerebrovascular and cardiovascular patients. The patients are also significantly older, which is driven in part by the differences in diagnoses. They are also more likely to be non-white, but this is a function of the geographic location of the chain provider's facilities. Finally, the provider uses inpatient care to a greater extent than the average hospice and does not use respite care.

Due to the limitations in the Medicare data, it is not possible to compare how these sample differences translate into differences in service utilization except with respect to the number of days enrolled. Overall, the mean patient at the chain provider was enrolled in hospice care for a greater number of days, but median patient for fewer days (Tables 2.1 and 2.2). This implies that the chain provider has a greater incidence of longer stays than the average hospice. The longer stays are driven in part by the differences in case mix and in part by much longer stays among cardiovascular, cerebrovascular, ill-defined debility, neurodegenerative, and respiratory patients. The vast majority of days billed are routine home care days for both the chain provider (90%) and the Medicare population (93%). But the chain provider uses inpatient care to a greater extent than the average hospice and does not use any respite care. For the chain provider, more than two-fifths (43%) of routine home care days are provided in nursing homes.

[1] This measure excludes visits by volunteers.
[2] Limiting the comparison to only freestanding hospice providers yielded similar results.

Ill-defined debility, neurodegenerative, and cerebrovascular patients received a majority of their routine home care days in a nursing home. Nursing home residence is not recorded in the Medicare data.

Tables 2.1 and 2.2 also show that there is substantial variation across diagnoses in the number of days enrolled. The average stay for cancer patients is shorter than for patients with cardiovascular, cerebrovascular, ill-defined debility and neurodegenerative diagnoses. The variation is evident in both the chain provider sample and in the Medicare population. Table 3 shows that this variation is also evident in other measures of service utilization. Cancer patients in the chain provider sample received fewer visits and incurred lower visit labor costs than patients with ill-defined debility and neurodegenerative disease, in part because of their shorter length of stay.

How well does the per diem system reflect current hospice resource use?

We estimated a standard (ordinary least squares or OLS) regression to examine how well the per diem payment categories explained hospice visits and visit labor costs. Tables 4.1 and 4.2 show the proportion of variation in the number of visits and in visit labor costs explained by the number and type of day billed for each patient. The adjusted R-squared is approximately 90% for both the number of visits and visit labor costs indicating these resource use measures are well explained by the per diem payment system. All three regressors are statistically significant predictors.[3]

There are two possible explanations for this result. First, dying patients may have similar clinical needs within the four levels of care corresponding to the per diem categories. Two physicians on our team specializing in hospice and palliative care felt that this was a plausible explanation for this finding. Alternatively, the regression results may simply reflect that the chain provider responded to the financial incentives of the current per diem system. It is not possible to distinguish between these alternative explanations.

Should case mix adjustment be considered?

The chain provider data contain a rich set of patient-level characteristics that may be useful in explaining patient costs and informing potential adjustments to the current payment system. Specifically, the dataset includes primary ICD-9 diagnosis codes, race/ethnicity, marital status, age, receipt of care in a nursing home, discharge status, and geographic location. We aggregated the individual, clinically similar ICD-9 codes into nine cancer and seven non-cancer diagnosis categories hypothesized to have similar resource use for the purpose of the analyses described below.

We tested whether these variables were predictors of resource use both on their own and in conjunction with the per diem category variables. Specification 2 of Tables 4.1 and 4.2 show the results of regressions on our service utilization measures when only the patient-level demographics and diagnoses are included. The regressions include primary diagnosis[4], age, race/ethnicity, marital status/living arrangement, discharge status and geographic location.

[3] We include only three types of days because the chain provider did not utilize inpatient respite care.
[4] The results shown are based on 16 diagnoses categories. We also estimated regression with a larger number of disaggregated categories. The results were qualitatively similar.

Service utilization was higher for patients who were younger, African-American, female, currently or formerly married (or living with a partner), and those who were discharged alive.[5] Cancer and HIV patients had significantly fewer visits and lower visit labor costs, while neurodegenerative and ill-defined debility patients had more visits and higher costs. Although many of the demographic variables and diagnosis categories were statistically significant, these factors explained only 11% and 8% of the variation in the number of visits and visit labor costs, respectively.[6]

When added to the model that contains the days by type variables, the demographic and diagnoses variables add little explanatory power, as shown in the third specification (see column 3 of Tables 4.1 and 4.2). Indeed, in a statistical sense they do not add any explanatory power when the number of variables added to the model is taken into consideration. Although many of these disease categories are statistically significant predictors of visits and visit labor costs their magnitudes are very small: the average prediction error between the two models differs by approximately ½ of a percent of the average episode visit labor costs.

The final specification includes an indicator variable for whether the patient received any routine home care in a nursing home as well as the interaction of nursing home care and age category. Again, the additional regressors are statistically significant, but fail to increase the explanatory power of the current per diem system.

Are the beginnings and ends of hospice stays more intensive?

The changes in the types of patients seen by hospices and the decline in length of stay since the benefit was implemented has raised concerns about a payment system that reimburses providers using a set of flat per diem rates that do not vary throughout a stay. Because the data from the chain provider record the admission date, discharge date, and the date of each visit, we were able to examine measures of the distribution of visits across each patient's stay to assess how well a constant per diem rate reflects the resource use throughout a hospice stay.

The data show that the first and last three days of stays are more intensive than days falling into the middle of a hospice stay. The median length of stay in the sample is 13 days and the median number of visits received is 18; the median number of visits received per day of 1.5. Table 5 shows the relative number of visits at the beginning, middle, and ends of hospice stays. Given that the median length of stay is less than two weeks, stays were broken into first three, last three, and middle days of each stay separately. Visits during stays of three days or less are allocated to the last three days: visits during stays of six days or less are allocated to first to the last three days and then to the first three days. At the median, patients receive twice as many visits during the last three days as they do in the "middle" days. Resource use is also higher at the beginning of the stay relative to the "middle" days. Because the beginning and ends of stays are relatively more expensive, a constant per diem rate may create incentives for providers to seek patients with longer lengths of stay. The flat per diem system may cause shorter stay patients, for whom it is more difficult to recoup these higher initial and final costs, to be less profitable than longer-stay patients.

[5] Patients can be discharged alive due to a change in diagnosis/prognosis, change in provider, or change of location of residence.

[6] The demographic characteristics and diagnosis categories explain only slightly more of the variation (13%) in days enrolled (not shown).

Implications for Policy

Policymakers have called for an analysis of potential refinements to Medicare's hospice payment system given how much the patient mix and treatment patterns have changed since the system was implemented. Using proprietary data from a large chain provider, we assessed whether the current payment system reflects hospice resource use, whether case mix adjustments could improve the payment structure, and whether the intensity of care varies within stays. While our analysis sample is not representative of the general Medicare population, our sample size and set of potential case mix adjusters are both large. Likewise, detailed data on visits provide the opportunity to examine individual service utilization patterns.

Our analyses show that the payment system variables, namely the number of days of each type billed for a patient, predict much of the variation in the number of visits and labor visit costs at the patient level. This indicates that the payment system still reflects our measures of resource use. It is not possible, however, to distinguish whether the strong relationship follows from the appropriateness of the payment structure or from the hospice provider responding to the system's financial incentives.

A related issue is whether patients' individual demographic characteristics and diagnoses can be used to improve the accuracy of the payment system. The proprietary dataset analyzed here provides an extensive sample of potential case mix adjusters. However, our regression analyses indicate that the available case mix adjusters, including diagnoses, were not powerful predictors of service utilization in this sample. These results do not preclude the utility of alternative adjusters that may be more closely related to service utilization, such as measures of functional limitations or comorbidities, but they do support our finding that the per diem categories reflect our measures of resource use well.

Our analyses reveal substantial variation in the intensity of care during a stay. Patients receive a greater number of visits and incur greater visit labor costs at the beginning and end of their stays. Because the beginning and end of stays are more intensive and thus more expensive than the intervening days, longer stay patients would have a lower average cost all else equal. Higher service utilization at the beginning and end of stays combined with a constant per diem payment system might now create incentives for providers to lower their average daily costs by seeking patients with longer lengths of stay.

These analyses suggest that the current payment system continues to reflect hospice patient costs and that diagnoses likely have limited potential as case mix adjusters. They do, however, suggest that adjusting per diem amounts to reflect greater resource use at the beginnings and ends of stays could be warranted. The findings also speak to the data requirements necessary to make informed policy decisions regarding actual payment adjustments. Previous studies have called for data collection efforts, but there was limited information on what variables should be collected. Our analyses of visit labor costs for over 68,000 patients with a diverse set of diagnoses, showed that basic demographics and diagnoses were not powerful explanatory factors upon which to base payment adjustments. But given that these patients received care from a single chain, the analyses would be strengthened by the examination of a more representative sample of hospices and patients. Factors more directly

related to necessary care – such as functional limitations and comorbidities – should also be investigated. The results also indicate that the collection of more detailed information on service utilization such as the number of visits, timing of visits, length of visits, site of visit, and type of discipline would be useful in understanding how well payments reflect costs in an era of changing patient populations and length of stay. Our analyses confirm that such data can be useful in examining how service utilization varies throughout a stay. Finally, a more comprehensive measure of costs that includes the individual resource use of non-labor inputs such as drugs and medical equipment would improve our understanding of hospice resource use.

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TABLE 1: SAMPLE STATISTICS (2002-2003)						
	Chain Provider		Medicare (Freestanding Only)		Medicare (All Claims)	
Category	**Frequency**	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**
Age Category						
Under 65	2820	4.10	155634	20.45	60251	5.10
65 to 74	12221	17.78	286669	37.66	249263	21.10
75 to 84	25405	36.97	279476	36.71	447308	37.87
85 & over	28279	41.15	39433	5.18	424434	35.93
Marital Status						
Divorced/separated/widow	40183	58.47	n.a.	n.a.	n.a.	n.a.
Married, living together	23000	33.47	n.a.	n.a.	n.a.	n.a.
Single	5542	8.06	n.a.	n.a.	n.a.	n.a.
Race						
Asian	691	1.00	4589	0.60	6688	0.57
Black	7960	11.58	66299	8.74	90425	7.68
Hispanic	7807	11.36	11345	1.50	15541	1.32
Other	422	0.61	7827	1.03	11417	0.97
White	51846	75.44	668453	88.13	1053159	89.46
Sex						
Female	41077	59.77	442914	58.19	680877	57.64
Male	27648	40.23	318298	41.81	500379	42.36
Nursing Home						
Routine Home Care in Nursing Home	19746	28.73	n.a.	n.a.	n.a.	n.a.
Discharge Status						
Died	62355	90.73	629740	82.73	978371	82.82
Diagnoses						
Cancer - Breast	1672	2.43	18377	2.46	30248	2.61
Cancer – Colorectal	2720	3.96	20659	2.76	34191	2.95
Cancer – Gynecological	1105	1.61	10651	1.42	17988	1.55
Cancer – Hematological	1721	2.50	11867	1.59	19284	1.66
Cancer – Kidney, Bladder	1254	1.82	13581	1.82	23012	1.99
Cancer – Lung, larynx, pleura	6652	9.68	81352	10.88	135228	11.67
Cancer – Other Gastroint.	3866	5.63	40972	5.48	67417	5.82
Cancer – Other	2749	4.00	16148	2.16	25601	2.21
Cancer – Prostate	1648	2.40	20749	2.78	34194	2.95
Cancer (Medicare only)	n.a.	n.a.	62179	8.32	105523	9.11
Cardiovascular	9768	14.21	100156	13.40	150538	12.99
Cerebrovascular	5880	8.56	47943	6.41	68981	5.95
HIV	415	0.60	3892	0.52	5656	0.49
Ill-Defined Debility	6197	9.02	85756	11.47	124469	10.74
Neurodegenerative	13602	19.79	115989	15.51	163547	14.12
Other Diagnosis	4369	6.36	39356	5.26	63392	5.47
Respiratory	5106	7.43	58072	7.77	89163	7.70

NOTES:

1. Age and racial differences between the chain provider and Medicare samples are significant at the 0.01 level.
2. The differences between the chain provider and Medicare-Freestanding samples are statistically significant at the 0.01 level except for breast and gynecological cancers (which are significantly different at the 0.05 level) and kidney cancer, other gastrointestinal cancer and respiratory, which are not significantly different.
3. The differences between the chain provider and Medicare-All Claims samples are statistically significant at the 0.01 level except for other gastrointestinal cancer (which is significantly different at the 0.05 level), and breast and kidney cancers and respiratory, which are not significantly different.

TABLE 2.1: DAYS BY DIAGNOSIS CATEGORY (CHAIN PROVIDER)

Disease Category	Total Days		Continuous Care Days		General Inpatient Days		Routine Home Days		Routine Home Care at Home	Routine Home Care at Nursing Home
	Mean	Med	Mean	Med	Mean	Med	Mean	Med	Mean	Mean
Cancer - Breast	54.5	17	3.6	0	2.8	0	48.1	10	34.3	13.9
Cancer – Colorectal	53.2	19	3.2	0	3.1	0	46.9	13	37.2	9.7
Cancer – Gynecological	44.7	17	3.6	0	3.6	0	37.4	9	27.6	9.8
Cancer – Hematological	32.4	9	2.3	0	2.4	0	27.7	4	20.5	7.1
Cancer – Kidney, Bladder	43.3	14	3.0	0	2.8	0	37.5	8	30.0	7.5
Cancer – Lung, Larynx, Pleura	41.4	14	2.7	0	2.8	0	35.8	9	29.2	6.7
Cancer – Other Gastrointestinal	39.4	14	3.0	0	2.8	0	33.6	8	28.5	5.1
Cancer – Other	40.2	15	3.5	0	3.3	0	33.4	9	26.3	7.1
Cancer – Prostate	48.3	16	3.1	0	3.0	0	42.2	11	32.3	9.8
Cardiovascular	62.5	11	3.2	0	2.7	0	56.5	5	37.7	18.8
Cerebrovascular	48.5	8	2.9	0	3.6	1	41.9	0	17.5	24.5
HIV	33.3	8	2.1	0	5.7	3	37.4	0	16.5	9.0
Ill-Defined Debility	94.7	23	3.9	1	1.6	0	89.2	17	34.9	54.4
Neurodegenerative	88.8	16	3.8	1	2.2	0	82.8	10	34.0	48.8
Other Diagnosis	26.8	6	1.9	0	2.8	0	21.9	0	13.8	8.1
Respiratory	62.0	9	3.0	0	3.1	1	55.8	3	41.9	14.0
Average	**60.4**	**13**	**3.2**	**0**	**2.8**	**0**	**54.5**	**7**	**30.9**	**23.6**
Percent of Total By Type of Day	**100%**		**5.3%**		**4.5%**		**90.2%**		**51.1%**	**39.0%**

TABLE 2.2: DAYS BY DISEASE (MEDICARE CLAIMS)										
Disease Category	**Total Days**		**Continuous Care Days**		**General Inpatient Days**		**Routine Home Days**		**Inpatient Respite Days**	
	Mean	**Med**	**Mean**	**Med**	**Mean**	**Med**	**Mean**	**Med**	**Mean**	**Med**
Cancer - Breast	48.5	22	2.0	0	0.1	0	45.0	19	1.3	0
Cancer – Colorectal	48.3	24	2.4	0	0.1	0	44.0	20	1.4	0
Cancer – Gynecological	43.0	22	2.0	0	0.1	0	39.0	19	1.5	0
Cancer – Hematological	34.3	13	2.0	0	0.1	0	30.7	10	1.2	0
Cancer – Kidney	40.5	18	1.9	0	0.1	0	36.9	15	1.3	0
Cancer – Lung, Larynx, Pleura	40.1	19	1.8	0	0.1	0	36.6	16	1.2	0
Cancer – Other Gastrointestinal	37.3	19	2.0	0	0.1	0	33.6	16	1.2	0
Cancer – Other	43.7	22	2.7	0	0.1	0	39.1	18	1.4	0
Cancer – Prostate	48.5	23	1.9	0	0.1	0	44.9	20	1.2	0
Cancer (Medicare Only)	40.6	19	1.2	0	0.1	0	37.8	17	1.2	0
Cardiovascular	52.7	17	2.0	0	0.1	0	49.7	15	1.2	0
Cerebrovascular	35.4	9	1.9	0	0.0	0	31.3	5	1.9	0
HIV	27.7	8	1.6	0	0.0	0	22.8	3	2.7	0
Ill-Defined Debility	54.5	18	1.6	0	0.1	0	52.3	16	0.9	0
Neurodegenerative	61.3	20	2.4	0	0.1	0	58.7	17	1.0	0
Other Diagnosis	28.5	9	1.6	0	0.0	0	25.0	6	1.5	0
Respiratory	50.4	15	2.0	0	0.1	0	45.0	19	1.3	0
Average	**46.5**	**17**	**1.9**	**0**	**0.1**	**0**	**43.2**	**14**	**1.3**	**0**
Percent of Total Days By Type	**100.0%**		**4.1%**		**0.2%**		**93.0%**		**2.7%**	

TABLE 3: AGE, VISITS AND VISIT LABOR COSTS BY DISEASE (Chain Provider)						
	Age		Number of Visits		Visit Labor Cost	
Disease Category	**Mean**	**Med**	**Mean**	**Med**	**Mean**	**Med**
Cancer - Breast	77.6	79	46.4	21	1853.1	765.8
Cancer – Colorectal	78.4	79	41.8	22	1676.2	746.2
Cancer – Gynecological	76.7	78	40.4	22	1734.5	802.3
Cancer – Hematological	78.5	79	29.1	13	1172.0	458.9
Cancer – Kidney, Bladder	78.7	79	36.7	19	1482.2	686.6
Cancer – Lung, Larynx, Pleura	76.1	76	33.9	18	1395.4	623.1
Cancer – Other Gastrointestinal	77.5	78	34.3	18	1468.9	628.6
Cancer – Other	76.8	78	38.0	19	1688.6	705.6
Cancer – Prostate	80.2	81	40.8	21	1599.1	738.0
Cardiovascular	84.7	86	49.6	17	1746.5	606.7
Cerebrovascular	83.3	84	42.7	12	1488.1	414.5
HIV	60.6	56	29.9	11	1220.5	347.7
Ill-Defined Debility	87.1	88	69.0	27	2218.5	955.9
Neurodegenerative	84.8	86	70.2	23	2233.1	906.5
Other Diagnosis	78.2	80	24.5	10	973.3	319.1
Respiratory	79.7	80	46.8	14	1680.9	494.6
Average	**81.4**	**82**	**48.6**	**18**	**1731.1**	**645.9**

Table 4.1: SERVICE UTILIZATION REGRESSIONS – NUMBER OF VISITS					
		Model (1)	Model (2)	Model (3)	Model (4)
Days Billed	Continuous Care	3.96***	---	3.82***	3.81***
	General Inpatient Care	1.13***	---	0.99***	0.99***
	Routine Home Care	0.57***	---	0.57***	0.57***
	Total	---	---	---	---
Age	65-74	---	-9.83***	0.76	1.61**
	75-84	---	-8.39***	1.13*	2.37***
	85 & over	---	-12.00***	0.42	2.06***
Race	Asian	---	-2.42	-2.59**	-2.59**
	Black	---	4.48***	1.09***	1.09***
	Hispanic	---	0.93	1.44***	1.45***
	Other	---	6.06	0.52	0.51
Marital Status	Married	---	4.96***	0.72	0.85*
	Widowed, Div., Sep.	---	3.50***	0.30	0.37
Gender	Female	---	9.73***	0.36	0.42*
Nursing Home	RHC in NH	---	34.52***	7.22***	13.36***
	RHC in NH*Age 65-74	---	---	---	-3.96***
	RHC in NH*Age 75-84	---	---	---	-6.12***
	RHC in NH*Age 85+	---	---	---	-7.17***
Discharge	Alive (Not extended)	---	8.55***	-3.86***	-3.89***
	Prognosis Extended	---	113.13***	-10.47***	-10.55***
Diagnosis	Cancer – Breast	---	-3.06	1.66**	1.68**
	Cancer – Colorectal	---	-2.07	-0.71	-0.64
	Cancer – Gynecological	---	-6.97***	1.21	1.29
	Cancer – Hematological	---	-13.31***	1.57**	1.59**
	Cancer – Kidney, bladder	---	-5.47**	0.68	0.74
	Cancer – Lung, larynx, pleura	---	-7.69***	-0.18	-0.11
	Cancer – Other Gastroint.	---	-7.33***	0.79	0.88
	Cancer – Other	---	-6.52***	1.73***	1.75***
	Cancer – Prostate	---	0.40	1.33	1.38*
	Cardiovascular	---	0.35	1.13**	1.11**
	Cerebrovascular	---	-9.02***	2.35***	2.30***
	HIV	---	-21.89***	0.32	0.33
	Ill-defined/Debility	---	10.18***	1.23**	1.30**
	Neurodegenerative	---	11.56***	4.06***	4.06***
	Other Diagnosis	---	-21.52***	0.93	0.95
Intercept	Constant	No	Yes	Yes	Yes
Year FE	Year Indicator Variables	No	Yes	Yes	Yes
Facility FE	Facility Indicator Variables	No	Yes	Yes	Yes
R-squared		0.914	0.111	0.891	0.891
Sample		68725	68725	68725	68725

TABLE 4.2: SERVICE UTILIZATION REGRESSIONS – VISIT LABOR COSTS					
		Model (1)	**Model (2)**	**Model (3)**	**Model (4)**
Days Billed	**Continuous Care**	300.21***	---	295.27***	295.17***
	General Inpatient Care	34.52***	---	27.32***	27.23***
	Routine Home Care	10.91***	---	10.79***	10.73***
	Total	---	---	---	---
Age	**65-74**	---	-463.31***	-46.59**	-10.85
	75-84	---	-459.19***	-58.03***	-15.92
	85 & over	---	-640.21***	-95.72***	-40.07
Race	**Asian**	---	-76.47	-52.28	-52.16
	Black	---	141.24***	17.35	17.66
	Hispanic	---	61.67	15.78	16.01
	Other	---	226.94	35.92	35.61
Marital Status	**Married**	---	232.17***	27.02*	30.82*
	Widowed, Div., Sep.	---	166.52***	15.32	17.37
Gender	**Female**	---	351.13***	26.03***	27.76***
Nursing Home	**RHC in NH**	---	1038.56***	148.29***	362.79***
	RHC in NH*Age 65-74	---	---	---	-171.00***
	RHC in NH*Age 75-84	---	---	---	-208.33***
	RHC in NH*Age 85+	---	---	---	-245.85***
Discharge	**Alive (Not extended)**	---	-267.34***	-101.31***	-102.17***
	Prognosis Extended	---	1507.03***	-355.99***	-358.88***
Diagnosis	**Cancer – Breast**	---	73.16	58.21**	59.09**
	Cancer – Colorectal	---	85.09	22.63	24.88
	Cancer – Gynecological	---	-4.22	41.07**	43.51
	Cancer – Hematological	---	-368.37***	6.52	7.25
	Cancer – Kidney, bladder	---	-54.54	17.52	19.10
	Cancer – Lung, larynx, pleura	---	-134.07**	7.17	9.23
	Cancer – Other Gastroint.	---	-58.35	28.37	30.92
	Cancer – Other	---	55.23	80.39***	81.05***
	Cancer – Prostate	---	148.94*	36.06	37.40
	Cardiovascular	---	14.94	-4.17	-4.87
	Cerebrovascular	---	-321.77***	-44.34**	-45.85**
	HIV	---	-730.16***	2.83	3.09
	Ill-defined/Debility	---	289.98***	-45.75**	-43.58**
	Neurodegenerative	---	229.94***	10.48	10.60
	Other Diagnosis	---	-697.37***	-31.79	-30.93
Intercept	**Constant**	No	Yes	Yes	Yes
Year FE	**Year Indicator Variables**	No	Yes	Yes	Yes
Facility FE	**Facility Indicator Variables**	No	Yes	Yes	Yes
R-squared		0.906	0.075	0.879	0.879
Sample		68725	68725	68725	68725

Note: Reference (excluded) group is white males aged under 65 with respiratory diagnosis that died in 2003.
Significant at 1% (***), 5% (**), and 10% (*) level.

TABLE 5: TIMING OF VISITS AND VISIT LABOR COSTS		
	Mean	**Median**
Days Enrolled	60.4	13
Number of Visits	48.6	18
Number of Visits per Day	1.5	1.1
Number of Visits per Day– First 3 Days	1.3	1
Number of Visits per Day– First 3 Days (including pre-admission visits)	1.4	1
Number of Visits per Day– Middle Days	1.1	0.8
Number of Visits per Day– Last 3 Days	2.0	1.7
Number of Visits per Day– Last 3 Days (excludes those discharged alive)	2.1	1.7
Visit Labor Costs	$1731.06	$645.93
Visit Labor Costs per Day	$69.28	$37.20
Visit Labor Costs per Day– First 3 Days	$53.84	$33.80
Visit Labor Costs per Day– First 3 Days (including pre-admission visits)	$57.20	$36.72
Visit Labor Costs per Day– Middle Days	$54.56	$20.11
Visit Labor Costs per Day– Last 3 Days	$113.86	$47.89
Visit Labor Costs per Day– Last 3 Days (excludes those discharged alive)	$122.60	$54.37