



Published in final edited form as:

Arch Intern Med. 2010 March 8; 170(5): 427–432. doi:10.1001/archinternmed.2009.547.

## Racial Differences in Hospice Utilization for Heart Failure

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### Abstract

**Background**—Heart failure is the leading non-cancer hospice diagnosis and the leading cause of hospitalization among Medicare beneficiaries. Racial differences in hospice use are well documented for cancer but poorly described for heart failure.

**Methods**—Based on a national sample of 98,258 Medicare beneficiaries aged 66 and older on January 1, 2001 with a diagnosis of heart failure, who were not enrolled in hospice in 2000, we determined the effect of race/ethnicity on hospice entry for heart failure in 2001 after adjusting for sociodemographic, clinical, and geographic factors.

**Results**—In unadjusted analysis, Blacks (odds ratio [OR] = 0.52) and Hispanics (OR = 0.43) used hospice for heart failure less than Whites. Racial/ethnic differences in hospice use for heart failure persisted after adjusting for markers of income, urbanicity, severity of illness, local density of hospice use, and medical comorbidity (adjusted odds ratio (AOR) for Blacks [AOR = 0.59 (95% confidence interval (CI), 0.47-0.73)], and for Hispanics [AOR = 0.49 (95% CI 0.37-0.66)], compared to Whites). Advanced age, greater comorbidity, emergency department visits, hospitalizations, and greater local density of hospice use were also associated with hospice utilization.

**Conclusions**—In a national sample of Medicare beneficiaries with heart failure, Blacks and Hispanics used hospice for heart failure less than Whites after adjustment for individual and market factors. This work extends the findings of racial and ethnic differences in hospice utilization to the leading non-cancer diagnosis. To understand the mechanisms underlying these findings, further examination of patient preferences and physician referral behavior are needed.

### BACKGROUND

Hospice care is designed to provide comfort and emotional support to patients and families in the setting of terminal illness, and is most commonly (84%) provided through the Medicare

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**Author contributions:** Dr Givens had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Study concept and design:** Givens, Tjia, Ash. **Acquisition of data:** Emanuel, Ash. **Analysis and interpretation of data:** Givens, Tjia, Zhou, Ash. **Drafting of manuscript:** Givens, Tjia. **Critical revision of manuscript for important intellectual content:** Givens, Tjia, Zhou, Emanuel, Ash. **Statistical analysis:** Givens, Tjia, Zhou, Ash. **Obtained funding:** Emanuel. **Study supervision:** Givens, Ash. Arranged for use of Medicare & Medicaid Services data: Emanuel, Ash

**Financial disclosure:** Dr. Ash is cofounder of, and consulting senior scientist at, DxCG Inc, a company whose software was used to measure morbidity burden in this study. Otherwise, there are no conflicts of interest or financial disclosures.

hospice benefit.<sup>1</sup> Although patients dying with cancer comprised 44% of hospice admissions in 2006, hospice can also offer substantial benefit to patients with other terminal illnesses such as end-stage heart failure. However, patients in the terminal stages of non-cancer diagnoses utilize hospice less frequently than those with advanced malignancies.<sup>1</sup>

Heart failure (HF) currently affects nearly 5 million people in the United States, and is the leading cause of hospitalization among Medicare beneficiaries.<sup>2</sup> Despite progress in treatment, 3-4 patients with advanced HF have a 1-year mortality of 50-70%,<sup>5</sup> and hospice care is increasingly recommended in guidelines for such patients.<sup>4, 6-8</sup> Although advanced heart disease represents the second most common hospice diagnosis, comprising 11.8% of hospice enrollees,<sup>1</sup> hospice services are generally recognized as underutilized by patients with HF.<sup>4, 9</sup>

Underutilization of hospice care is well documented, especially among racial and ethnic minorities.<sup>10-14</sup> Racial/ethnic differences in hospice utilization have been found across a spectrum of cancer diagnoses,<sup>15-17</sup> and may be more pronounced for non-cancer diagnoses.<sup>18</sup> However, previous studies of racial differences in hospice use have been limited to cross-sectional or retrospective analyses, which have had limited ability to assess life expectancy or severity of illness among potential hospice recipients.<sup>10, 11, 13-15, 18</sup> In this study, we use data from a large, nationally-representative, ethnically diverse cohort of Medicare beneficiaries with HF to estimate the independent effect of race/ethnicity on hospice utilization for HF in the coming year, after adjusting for demographics, in-hospital interventions, comorbidity and geographic variation in hospice utilization.

## METHODS

### Data Source

We used a national sample of Medicare beneficiaries oversampled for non-Whites as previously described.<sup>19</sup> The data source included merged Medicare claims files (denominator, inpatient, carrier, outpatient and hospice utilization files) from 2000 and 2001. An initial sample of one million beneficiaries aged 66 years and older were selected from the Medicare denominator file for 2001 with deliberate oversampling of beneficiaries who died in 2001, as well as racial/ethnic minorities categorized Black, Hispanic, and "Other." These files were merged with the National Death Index (NDI) from 2001 to verify date of death.

### Study population

We included Medicare beneficiaries who had complete claims data from 2000 and 2001, resided in the United States, were not enrolled in Medicare managed care organizations and who were not entitled to the Medicare end-stage renal disease (ESRD) benefit. Among those meeting the above initial inclusion criteria (n=603,128), we limited the study sample to those beneficiaries (n=98,258) with at least one physician or hospital encounter with a diagnosis of HF (International Classification Diagnoses, Ninth Revision – Clinical Modification [ICD-9 CM] codes: 428.xx, 398.91, 402.11, 402.91, 404.11, 404.13, 404.91, or 404.93) and who were not enrolled in hospice between January 1, 2000 and December 31, 2000. Based on the sampling, these individuals reflect the experience of approximately 2.7 million beneficiaries.

### Measurements

**Outcome Variable**—Our primary outcome variable was entry into hospice with an admitting diagnosis of heart failure between January 1, 2001 and December 31, 2001. We identified hospice entry from the first hospice admission date in 2001 and calculated hospice duration from first admission date until death or December 31, 2001 for non-decedents.

## Predictor Variables

**Race/Ethnicity:** We used the Medicare denominator file categories of White, Black, and Hispanic, collapsing all remaining categories (including Asian, North American natives and unknown) into “Other.”

**Medical Comorbidity:** To characterize the morbidity of participants, we calculated prospective Diagnostic Cost Group (DCG) scores derived from outpatient, inpatient, and carrier claims for 2000 (DxCG version 6.1 for SAS Windows). The DCG score predicts Medicare costs “next year,” as calculated from one year’s ICD-9 CM diagnosis codes, age and sex, and is expressed as a relative risk.<sup>20</sup> Thus, a score of 1.0 indicates an expected level of future health care utilization equal to the mean for Medicare beneficiaries, and 2.0 indicates expected costs that are twice as high. This score also predicts other outcomes well, including mortality.<sup>21</sup>

**Utilization of medical services:** To characterize each beneficiary’s HF severity, we used the inpatient utilization file from 2000 to calculate the number of emergency department (ED) visits and hospitalizations, and the number of days spent in an intensive care unit (ICU) or coronary care unit (CCU).

**Other socio-demographic variables:** We use the denominator file to capture beneficiary age and sex and to define a geography-based socioeconomic status indicator – median income of ZIP code of residence – as determined from 2000 U.S. Census data. We also used a marker for a state’s Medicaid purchase (that is, “Medicaid buy-in”) of the Part B benefit as an indicator of low individual income.

**Competing hospice diagnoses:** We used our software’s Condition Categories to identify other common morbidities present in 2000 that could lead to hospice in 2001: cancer, dementia, stroke, and chronic obstructive pulmonary disease (COPD).

**Geographic variables:** Because hospice availability<sup>22</sup> and utilization<sup>4, 10, 23</sup> differ by place of residence, we created two geographic variables from beneficiary ZIP code of residence. The first measures urbanicity, since persons in rural settings typically have less access to hospice services.<sup>10, 22</sup> We used the Beale rural-urban continuum codes<sup>24</sup> to categorize urbanicity as follows: metropolitan region with population  $\geq 1$  million; metropolitan region with population  $< 1$  million; non-metropolitan region; unknown.

We also developed a novel, hospice-specific, health service area-based variable that we call “local hospice density,” derived from the larger dataset of HF and non-HF beneficiaries who met our initial eligibility criteria ( $n = 603,128$ ) described above. This variable describes the local prevalence of hospice use among the 2001 decedents in this dataset ( $n = 158,903$ ). Health service areas (HSAs) are either single counties or clusters of counties that are relatively self-contained with respect to hospital care, and delineate local health care markets for community-based primary inpatient care. First, we located each decedent in the HSA containing his or her ZIP code of residence. We then defined the local density of hospice use as the percentage of the HSA’s decedents who entered into hospice. For HSAs with fewer than 50 decedents in our data, we substituted the density of hospice use for the hospital referral region (HRR) that contains it. HRRs consist of one or more HSA and represent the tertiary market for medical care, including referral or specialty care.<sup>25</sup>

## Statistical Analysis

We used descriptive statistics to characterize the demographics, health characteristics, health care utilization (including hospice entry) and mortality of the study population by race/ethnicity

category. All analyses were conducted using sampling weights to obtain population-based estimates and a linearized variance estimator based on a first-order Taylor series linear approximation to compute standard errors.<sup>26</sup> The sample weights represent the reciprocal of the sampling probabilities for each of the eight strata represented in the total sample of 1 million beneficiaries (two based on decedent status and four based on race/ethnicity). To assess the statistical significance of bivariate associations, we used adjusted Wald test for continuous variables, design-based Pearson chi-square test for categorical variables and a nonparametric equality-of-medians test for medians.

To identify the independent association of race/ethnicity on hospice entry for HF, we developed a series of weighted logistic regression models with the outcome of hospice entry for HF in 2001. Models successively added covariate sets: race alone (Model 1); age and sex (Model 2); urbanicity, income, hospitalizations, ED visits, number of ICU and CCU days, diagnoses of cancer, COPD, dementia or stroke and DCG score (Model 3); and, local hospice density (Model 4). To examine whether our findings were due to differences in local health care delivery systems not captured in our data, we also developed a fixed-effects regression model that compares members of different racial groups only when they reside in the same HSA. Since the findings of this sensitivity analysis are quite similar to the more conceptually revealing original analysis described above, we present the results of the original analysis described above.

Analyses were conducted using STATA v10.0 (STATA Corporation, College Station, TX) and SAS v 9.0 (SAS Corporation, Cary, NC). This study was approved by the Institutional Review Board of the Boston University School of Medicine.

## RESULTS

### Characteristics of the Study Population

The final study population included 98,258 Medicare beneficiaries (weighted  $n = 2.7$  million). The weighted percentages by race were: 88.3% White, 8.5% Black, 1.4% Hispanic, and 1.8% Other. Many differences in socio-demographic characteristics, DCG scores, and severity of illness measures by race/ethnicity were statistically significant. (Table 1) Black, Hispanic and beneficiaries of Other race were more likely to live in large metropolitan urban areas. Black and Hispanic beneficiaries had lower incomes and were more likely to have Medicaid buy-in. There were also notable age differences between groups, with Black and Hispanic beneficiaries being younger than Whites and Others. Differences in markers of health and health care utilization were notable, with Hispanics having the highest mean DCG score, hospitalizations, stays in the coronary care unit and intensive care unit, and emergency department visits. Overall, 52.7% of beneficiaries in our sample (in which 2001 decedents were over-represented) died in 2001.

Unadjusted use of hospice for HF and for any reason differed by race (Table 2). The percentage of beneficiaries utilizing hospice for any diagnosis in 2001 was small (3.9%). Of these, 18.2% entered for HF. The percent of decedents utilizing hospice was 19.9% overall, with a higher percentage of white decedents (20.4%) using hospice than Blacks (15.4%), Hispanics (16.9%), or those of other race/ethnicity (16.3%). Among decedents and non-decedents, Whites had higher rates of hospice entry for any diagnosis: Whites (4.1%), Blacks (2.8%), Hispanics (2.4%) other race/ethnicity groups (2.8%). Among those who utilized hospice, a higher percentage of Whites entered hospice for HF (18.5%) than Blacks (14.1%), Hispanics (13.2%) and other race/ethnicity groups (15.8%). Duration of hospice was low (median = 12 days), but was higher for Blacks (14 days) than for Whites (11 days), Hispanics (12 days) and other race/ethnicity groups (11 days). For HF, Hispanics had the longest median duration (19 days), followed by Blacks (14 days), Whites (13 days) and other race/ethnicity groups (10 days).

## Multivariable Models for Hospice Use for HF

Non-Whites used hospice for HF less than Whites (Table 3). After adjusting for sociodemographics, urbanicity, comorbidities, DCG score, use of medical services, and local hospice density (Model 4), hospice utilization remained lowest for Hispanic beneficiaries (adjusted odds ratio [aOR] = 0.49) compared to Whites. Blacks and other non-White race/ethnic beneficiaries with HF were also less likely to use hospice (aOR = 0.59) and (aOR = 0.64), respectively. Gender, income, Medicaid buy-in status, greater days in the intensive care or coronary care unit, greater numbers of emergency department visits, and geographic residence in an urban area were not significantly associated with hospice entry. Higher DCG score, advanced age, emergency department visits and hospitalizations, as well as greater local hospice density were associated with hospice utilization. Competing hospice diagnoses of COPD, dementia and stroke were not associated with hospice use, but a diagnosis of cancer was protective against entry into hospice for heart failure (aOR = 0.72).

## DISCUSSION

This analysis of a national cohort of Medicare beneficiaries finds marked racial/ethnic differences in hospice utilization for heart failure. In our sample, Blacks had 40% lower odds of hospice use, and Hispanics 50% lower odds of receiving hospice than Whites. Our study is the largest, longitudinal cohort study examining factors associated with hospice entry for a non-cancer diagnosis. In addition, we utilize a prospective design as well as a novel measure of local hospice utilization.

Our finding that racial and ethnic minorities are less likely to utilize hospice for HF is consistent with other hospice literature. Several studies have documented lower rates of hospice use among Blacks, Hispanics, and Asian Americans compared to Whites. However, these studies have either specifically focused on patients with cancer<sup>14-16</sup> or do not define the diagnosis determining hospice entry.<sup>12, 13 27</sup> There is concern that racial disparities may be more pronounced among patients with non-cancer diagnoses than among those with cancer.<sup>18</sup> To our knowledge, this is the first large study to document racial differences in hospice utilization among patients with HF, the most common non-cancer hospice diagnosis. Our findings document significant racial difference in hospice use and counter speculation that overall increases in the availability of hospice services in the 1990s may have erased racial differences in hospice utilization.<sup>11</sup>

In this study we have adjusted for numerous factors related to hospice entry, many of which vary substantially by race/ethnicity. Geographic variation in hospice availability is associated with patterns of hospice utilization,<sup>10</sup> including hospice entry for HF.<sup>4</sup> Hospice availability differs between urban and rural areas,<sup>10, 22, 23</sup> and lower hospice use has been documented among patients living in predominantly minority versus White areas.<sup>28</sup> On a state level, greater regional availability of hospice services is associated with less racial disparity between Blacks and Whites in hospice utilization.<sup>27</sup> We created a variable to represent the prevalence of hospice use among Medicare decedents within smaller local geographic units (HSAs) and found that our observed racial/ethnic differences in hospice use for HF persisted after accounting for local hospice availability, as well as urbanicity.

In addition to socio-demographic, clinical and geographic characteristics, cultural beliefs and values may contribute to differences between Blacks and Whites in end-of-life care and hospice utilization.<sup>29, 30</sup> For example, compared to Whites, Blacks are less likely to complete advance directives, have less favorable beliefs about hospice care, opt for more aggressive treatments, and are more likely to have spiritual beliefs that conflict with the goals of palliative treatment.<sup>19, 29, 31</sup> Additionally, lack of trust between patients and medical providers may be more pronounced for racial/ethnic minorities<sup>32, 33</sup> and may contribute to racial differences in hospice



entry.<sup>34, 35</sup> Blacks more often report receiving inadequate information regarding end-of-life care,<sup>36</sup> and are less likely to be informed about hospice services than Whites.<sup>37</sup> Our administrative data contained neither information on patient cultural beliefs and values, nor on physician behavior, factors which may also help explain differences in hospice utilization. Lastly, health literacy – also not measured in this study – has been found to partially explain racial differences in end-of-life treatment preferences.<sup>38</sup>

This study has several limitations. First, we could not measure HF severity using clinical markers such as ejection fraction or exercise tolerance, and thus, HF severity might vary by race/ethnicity. However, we did adjust for prior-year measures of emergency department visits and hospitalizations, ICU and CCU utilization, as proxies for clinical complications and disease severity. Second, while race/ethnicity coding in the Medicare denominator file has a good positive predictive value for identifying Whites, Blacks and Hispanics (>94%), it performs less well for Asians and American Indian/Alaskan Native beneficiaries,<sup>39</sup> making findings for the Other race/ethnicity category difficult to interpret. Finally, although higher hospice utilization has been reported among enrollees from health maintenance organizations compared to patients with traditional Medicare coverage,<sup>40</sup> we could not include such patients in our study sample because of incomplete capture of diagnoses and health care utilization.

This paper is the largest non-cancer study of hospice entry to date. It prospectively examines a national probability sample of people with heart failure, oversampled for racial minorities and future decedents. Large differences in racial/ethnic minority use of hospice for heart failure compared to Whites remain largely unchanged after adjusting for differences in income, urbanicity, comorbidity, severity of illness, and hospice use density. It is not clear how much of these differences reflect access issues as opposed to considered patient preferences.

## Acknowledgments

**Funding:** This study was supported by contracts with the Department of Bioethics of the Clinical Center of the National Institutes of Health. Dr. Tjia is supported by a NIA Career Development Award (NIH NIA K08AG021527).

**Role of the sponsor:** The funding sources had no role in the design and conduct of the study; in the collection, management, analysis and interpretation of the data; or in the preparation of the manuscript.

Funding sources: 1. Department of Bioethics of the Clinical Center of the National Institutes of Health (NIH); 2. NIH NIA K08AG021527 (Dr. Tjia)

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**Table 1**

Characteristics of heart failure study subjects in 2000 by race/ethnicity

Sample size Population size*	All	White	Black	Hispanic	Other	P value <sup>†</sup>
	98,258 2,724,200	33,957 2,404,426	32,411 231,337	15,903 38,987	15,987 49,450	
	Weighted % or mean (linearized standard error [SE])					
Age in years, mean (SE)	79.9 (0.05)	80.1 (0.06)	78.2 (0.06)	77.7 (0.06)	79.6 (0.07)	< 0.001
Age year ranges (%)						
66-75	26.9	25.6	37.3	36.4	30.4	< 0.001
76-85	44.3	44.8	39.8	47.0	39.6	
Over 85	28.9	29.6	22.9	16.7	30.0	
Male (%)	39.0	39.6	32.8	39.7	40.8	< 0.001
Urbanicity (%)						
Metropolitan ≥ 1M	36.3	34.5	51.1	45.8	47.5	< 0.001
Metropolitan < 1M	26.1	26.8	19.3	23.9	21.2	
Non-metropolitan	25.7	26.9	17.3	11.8	16.2	
Unknown	12.0	11.7	12.4	18.5	15.1	
Median income, ZIP code of residence (%)						
< \$25,000	6.5	4.4	24.6	24.2	9.7	< 0.001
\$ 25,001-35,000	30.3	29.6	38.9	34.5	23.3	
\$35,001-45,000	30.6	31.6	22.1	23.7	27.2	
> \$45,000	32.5	34.3	14.3	17.6	39.8	
Medicaid buy-in (%)	20.8	16.9	47.0	70.3	51.8	< 0.001
DCG score, mean (SE)	2.5 (0.01)	2.5 (0.01)	2.6 (0.01)	2.8 (0.01)	2.6 (0.01)	< 0.001
Any hospitalization (%)	54.7	54.6	56.1	57.3	49.4	< 0.001
Number of hospitalizations, mean (SE)	1.06 (0.01)	1.05 (0.01)	1.16 (0.01)	1.23 (0.01)	0.94 (0.01)	< 0.001
Any CCU stay (%)	11.8	11.9	11.5	14.1	10.7	< 0.001
Days in CCU, mean (SE)	0.65 (0.02)	0.65 (0.02)	0.64 (0.02)	0.88 (0.03)	0.57 (0.02)	< 0.001
Any ICU stay (%)	19.3	19.3	18.6	24.3	19.1	< 0.001
Days in ICU, mean (SE)	1.04 (0.03)	1.02 (0.03)	1.11 (0.03)	1.59 (0.04)	1.13 (0.03)	< 0.001
Any ED visit (%)	48.2	48.3	46.6	54.2	45.5	< 0.001

Sample size Population size*	All	White	Black	Hispanic	Other	P value <sup>†</sup>
	98,258 2,724,200	33,957 2,404,426	32,411 231,337	15,903 38,987	15,987 49,450	
Number of ED visits, mean (SE)	1.06 (0.01)	1.05 (0.01)	1.12 (0.01)	1.39 (0.02)	0.97 (0.01)	< 0.001

DCCG: Diagnostic Cost Group

CCU: Coronary Care Unit

ICU: Intensive Care Unit

ED: Emergency Department

\* Estimated from sampling weights

<sup>†</sup> Statistical significance by adjusted Wald test for continuous variables and Pearson chi square statistic for categorical variables

Table 2

Mortality and hospice utilization in 2001 by race/ethnicity

Sample size Population size*	All 98,258 2,724,200	White 33,957 2,404,426	Black 32,411 231,337	Hispanic 15,903 38,987	Other 15,987 49,450	P value <sup>†</sup>
	Weighted %, mean ± standard error (SE), or median (25 <sup>th</sup> , 75 <sup>th</sup> %tile)					
Death (%)	15.9	16.1	14.7	11.7	14.1	<0.001
Any hospice utilization (%)	3.9	4.1	2.8	2.4	2.8	<0.001
Decedents utilizing hospice (%)	19.9	20.4	15.4	16.9	16.3	<0.001
Percent of hospice users with an admitting diagnosis of heart failure	18.2	18.5	14.1	13.2	15.8	<0.001
Days of hospice use (all diagnoses): median (25 <sup>th</sup> -75 <sup>th</sup> percentile)	12 (5-37)	11 (5-37)	14 (5-40)	12 (4-32)	11 (5-33)	<0.001
Days of hospice use (heart failure), median (25 <sup>th</sup> -75 <sup>th</sup> percentile)	13 (4-38)	13 (5-38)	14 (4-41)	19 (6-58)	10 (4-34)	<0.001
Local hospice utilization density, mean (SE) <sup>‡</sup>	25.5 (0.001)	25.8 (0.001)	24.0 (0.001)	23.3 (0.001)	23.1 (0.001)	<0.001

\* Estimated from sampling weights

<sup>†</sup> Statistical significance by Pearson chi square statistic for categorical variables, nonparametric equality-of-medians test<sup>‡</sup> Mean "percent of all decedents who used hospice" in each beneficiary's (Dartmouth Atlas) health service area (HSA)

**Table 3**

Year-2000 predictors of entry into hospice with an admitting diagnosis of heart failure in 2001

	Model 1	Model 2	Model 3*	Model 4*
	OR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Race/Ethnicity				
White	Ref	Ref	Ref	Ref
Black	0.52 (0.44-0.63)	0.60 (0.50-0.72)	0.57 (0.46-0.71)	0.59 (0.47-0.74)
Hispanic	0.43 (0.34-0.54)	0.53 (0.41-0.67)	0.46 (0.34-0.61)	0.49 (0.37-0.66)
Other	0.58 (0.48-0.70)	0.59 (0.48-0.71)	0.57 (0.46-0.71)	0.64 (0.52-0.80)
Age in years		1.08 (1.07-1.09)	1.09 (1.07-1.10)	1.09 (1.07-1.10)
Male		1.17 (0.95-1.43)	1.17 (0.95-1.45)	1.16 (0.94-1.44)
Urbanicity				
Metropolitan > 1M			Ref	Ref
Metropolitan < 1M			1.07 (0.83-1.38)	1.08 (0.84-1.40)
Non-metropolitan			0.82 (0.62-1.09)	0.90 (0.68-1.20)
Unknown			1.19 (0.87-1.63)	1.07 (0.78-1.48)
Median income, ZIP code of residence (%)				
< \$25,000			Ref	Ref
\$ 25,001-35,000			1.00 (0.64-1.57)	0.92 (0.58-1.44)
\$35,001-45,000			0.97 (0.61-1.54)	0.84 (0.53-1.34)
> \$45,000			1.16 (0.73-1.86)	0.98 (0.61-1.57)
Medicaid buy-in 2000 (vs not)			0.99 (0.76-1.30)	1.03 (0.79-1.34)
Diagnostic Cost Group score			1.11 (1.03-1.20)	1.13 (1.04 -1.22)
Health care utilization				
Emergency department visits			1.04 (0.99-1.09)	1.05 (1.00-1.10)
Number of hospitalizations			1.14 (1.07-1.21)	1.13 (1.07-1.20)
Intensive care units days			1.00 (0.98-1.01)	1.00 (0.98-1.01)
Coronary care unit days			1.02 (1.00-1.03)	1.01 (1.00-1.03)
Competing hospice diagnoses				
Cancer (any type)			0.70 (0.57-0.87)	0.72 (0.58-0.89)
COPD*			1.17 (0.95-1.45)	1.14 (0.92-1.41)
Dementia			1.07 (0.82-1.39)	1.07 (0.83-1.39)
Stroke			0.98 (0.75-1.29)	0.98 (0.74-1.29)
Local density of hospice use				
Lowest quintile				Ref
2 <sup>nd</sup> quintile				2.54 (1.69-3.80)
3 <sup>rd</sup> quintile				3.27 (2.28-4.69)
4 <sup>th</sup> quintile				4.30 (3.05-6.07)
Highest quintile				6.10 (4.37-8.53)

\* Chronic Obstructive Pulmonary Disease