Use of Aggressive Medical Treatments Near the End of Life: Differences between Patients with and without Dementia

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Objective. To analyze whether acute care patients with dementia are more or less likely to receive each of five aggressive medical services near the end of life, compared with patients without dementia.

Data Sources. Two years of Veterans Affairs (VA) and Medicare utilization data for all 169,036 VA users nationwide age 67 and older who died between October 1, 1999 and September 30, 2001.

Study Design. We performed a retrospective analysis of acute care stays discharged in the final 30 days of life. The main outcome measure was the patient's likelihood of receiving each of five aggressive services (intensive care unit [ICU] admission, ventilator, cardiac catheterization, pulmonary artery monitor, and dialysis), controlling for demographic and clinical factors in probit regressions.

Principal Findings. There were 122,740 acute-stay discharges during the final 30 days of life, representing 94,100 unique patients (31,654 with dementia). In probit models comparing acute care patients with and without dementia, patients with dementia were 7.5 percentage points less likely to be admitted to the ICU (95 percent confidence interval [CI], 6.9–8.1; percent of stays with ICU admission = 36.8 percent), 5.4 percentage points less likely to be placed on a ventilator (95 percent CI, 5.0–5.9; percent of stays with ventilator use = 17.1 percent), 0.7 percentage points less likely to receive cardiac catheterization (95 percent CI, 0.6–0.8; percent of stays with cardiac catheterization = 2.7 percent), 1.4 percentage points less likely to receive pulmonary artery monitoring (95 percent CI, 1.2–1.5; percent of stays with pulmonary artery monitoring = 2.6 percent), and 0.6 percentage points less likely to receive dialysis (95 percent CI, 0.4–0.8; percent of stays with dialysis = 4.6 percent).

Conclusions. During the final 30 days of life, acute care patients with dementia are treated substantially less aggressively than patients without dementia. Further research is warranted to determine the causes and appropriateness of these patterns of care.

Key Words. Acute inpatient care, end-of-life decisions, VA health care system, administrative data uses

In many areas of health care large disparities exist in terms of who does and does not receive certain procedures or types of treatment. Disparities have been shown to exist along the lines of age (Stone et al. 1996; Levinsky et al. 2001; Mitchell et al. 2003), race or ethnicity (Gornick et al. 1996; Stone et al. 1996; Mitchell et al. 2003; Skinner et al. 2003), income (Gornick et al. 1996), gender (Stone et al. 1996; Mitchell et al. 2003; Skinner et al. 2003), geographic location (Mitchell et al. 2003; Skinner et al. 2003), and presence or absence of mental illnesses (Druss et al. 2000; Craddock-O'Leary et al. 2002). Health care delivered within the final weeks or months of life is not only increasingly controversial (Sloan and Taylor 1999; Weiss 1999; Rocker and Curtis 2003), but also exceedingly costly (Levinsky et al. 2001). It is not surprising, therefore, that research on the aggressiveness and cost of care at the end of life has found disparities along the same dimensions (Ahronheim et al. 1996; Hopp and Duffy 2000; Rose et al. 2000; Levinsky et al. 2001; Shugarman et al. 2004; Wennberg et al. 2004).

Persons with dementia may present certain clinical and ethical dilemmas when it comes to end-of-life care. Dementia disorders are typically degenerative, and although an estimated 13 percent of cases may be at least potentially reversible (Clarfield 1988), few of these cases actually respond to therapy (Freter et al. 1998). Optimally, treatment at the end of life is guided by patient preferences (AGS Ethics Committee 1995), and the quality of end-of-life care is often assessed in large part according to the extent to which providers adhere to those preferences (Wenger and Rosenfeld 2001; Clarke et al. 2003). While persons with mild dementia may be able to take part in end-of-life decision making, those with more severe impairments often lack decision-making capacity (Hirschman et al. 2004). For these severely demented patients, clinicians may need to rely on a combination of advance directives, which are often not available or not specific enough to be directly applied to a given situation (Teno et al. 1997; Goodman, Tarnoff, and Slotman 1998), or professional or surrogate judgment that may fail to accurately represent the wishes of the patient (Coppola et al. 2001; Fried, Bradley, and Towle 2003).

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There is concern that these decisions may lead to more aggressive treatment than the patient would have chosen, as physicians, families, and courts err on the side of prolonging life (Francis 2001). There has been a realignment of professional and lay opinion on the use of feeding tubes and other non-palliative options for patients with advanced dementia, with such burdensome procedures generally being considered less appropriate (Prendergast and Luce 1997; Gjerdingen et al. 1999; Gillick 2000). However, current financial incentives, health policies, and organizational factors tend to discourage the use of palliative care or hospice (Buntin and Huskamp 2002), and it is unclear whether actual practice has evolved toward providing more palliative care for patients with advanced dementia. In a recent study comparing end-of-life nursing home care between patients with advanced dementia and patients with terminal cancer, patients with dementia were substantially less likely to have advance directives limiting care and more likely to receive burdensome interventions, such as tube feeding, laboratory tests, and restraints (Mitchell, Kiely, and Hamel 2004). In a study of hip fracture and pneumonia patients, patients with end-stage dementia received as many painful or uncomfortable procedures as cognitively intact patients, despite having 6-month mortality rates of 55 percent, compared with 12 percent for cognitively intact patients (Morrison and Siu 2000). The authors of both studies suggest that more emphasis should be placed on conservative care for demented patients with poor prognoses.

At the same time there is also concern that patients with dementia may experience a number of barriers to adequate treatment. For example, persons with dementia are often unable to advocate for their own care (Advisory Panel on Alzheimer's Disease 1996), financial incentives may favor reduction in care (Advisory Panel on Alzheimer's Disease 1996), many medical professionals lack the skills to properly treat patients with dementia (Advisory Panel on Alzheimer's Disease 1996; Stone 2001), current policy regarding long-term care assumes the existence of capable family caregivers who may not in fact be available (Montgomery and Williams 2001), and there may be stigma associated with dementia (Jolley and Benbow 2000). However, there has been scant research indicating that patients with dementia are actually at greater risk of underuse of appropriate services.

The Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatments (SUPPORT) reported that compared with patients without dementia, patients with dementia were more likely to have chart documentation of a decision to withhold dialysis, but there were no significant differences in decisions to withhold ventilator use or surgery after controlling

for other factors (Hamel et al. 1999). We are unaware of any large nationwide studies investigating whether patients with dementia are actually treated more or less aggressively near the end of life, and our study aims to fill this gap. Using data from Veterans Affairs (VA) and Medicare, we analyzed whether acute care patients with dementia were more or less likely to receive any of five aggressive medical services.

METHODS

Sample Selection

We used the VA Benefits Identification and Records Locator Subsystem Death File and health care utilization files to identify all 169,036 veterans over age 67 who died between October 1, 1999 and September 30, 2001 and used the VA health care system in the final 2 years of life. We excluded patients below age 67 at death so that all subjects were eligible for both Medicare and VA during the study period: the final 2 years of life.

We obtained patients' health care utilization during the final 2 years of life from VA and Medicare administrative files. We included the Patient Treatment File (PTF) for VA inpatient care, the event file for VA outpatient care (VA Information Resource Center 2005), the Medical Provider Analysis and Review (MEDPAR) file for Medicare inpatient care, and the Physician/Supplier file for Medicare outpatient care. We also included any utilization in Medicare's Hospice file, Home Health file, Hospital Outpatient file, or Durable Medical Equipment file (Research Data Assistance Center 2005).

We identified patients with dementia using the diagnoses reported in the VA or Medicare records. We adopted the disease classification developed by the VA Dementia Registry Task Force (Krishnan et al.). Patients with an International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) code indicating dementia during the final 2 years of life in any of the utilization databases were identified as having dementia (Appendix 1 lists the diagnosis codes used).

Measurement

We measured aggressiveness of medical services provided during the end of life, using intensive care unit (ICU) admission and four surgical procedures: ventilator, pulmonary artery monitor, cardiac catheterization, and dialysis. These treatments were identified as aggressive when provided to patients near

their end of life by a panel of physicians for a previous study (Levinsky et al. 2001). We used surgical procedure codes in Medicare's MEDPAR file and the VA's PTF file to identify these treatments.

Analysis

We compared the use of aggressive treatments between patients with dementia and those without dementia using bivariate and multivariate analyses. We further examined the differences in aggressive treatments between VA and Medicare hospitals. We analyzed all medical/surgical hospital stays and "short hospital stays" recorded in VA and Medicare files, respectively; the level of analysis was a stay. We stratified bivariate analyses by age, to account for the substantial difference in average age between patients with and without dementia. We used a probit model for multivariate analyses, controlling for age, sex, race, principal diagnosis for the stay, and comorbid conditions measured by the Deyo adaptation of the Charlson Comorbidity Score, excluding dementia diagnoses (Charlson et al. 1987; Deyo, Cherkin, and Ciol 1992). (We also ran analyses including dementia diagnoses in the Charlson score, but this did not substantially alter results.) VA models (but not Medicare or combined models) also control for the number of ICU beds per 100,000 unique patients in the station where the stay occurred. This value was unavailable for two stations, and stays in these stations were excluded from VA probit analyses.

We divided ages into three groups (67–74, 75–84, 85+) and Charlson scores into five groups (0, 1–2, 3–4, 5–6, 7+) to allow for nonlinear effects. We identified race as black, white, other, or unknown, using both Medicare and VA data; in cases of discrepancy we assigned priority to Medicare data. We grouped principal diagnoses using the Clinical Classification Software developed in the Healthcare Cost and Utilization project funded by the Agency for Healthcare Research and Quality (Agency for Healthcare Research and Quality 2005). We identified all groups that accounted for at least 1 percent of the hospital stays and put other principal diagnoses into a single group. This resulted in 25 top categories, representing 61.4 percent of all hospital stays. Our primary analyses investigated discharges in the final 30 days of life, but we also analyzed data for the final 90 days and final year of life.

All data extraction, management, and bivariate analyses used *SAS* statistical software (SAS Institute Inc., Cary, NC), and multivariate analyses used *STATA* statistical software (StataCorp LP, College Station, TX).

RESULTS

Table 1 presents demographics and dual-use patterns of our sample, both overall and grouped by dementia status. More than half of our sample were between the ages of 75 and 84, along with 33 percent between 67 and 74, and 11 percent age 85 or older. Eighty-five percent were white, and as is typical for an elderly VA cohort, over 98 percent were male. Eighty-seven percent received at least some care through the Medicare system during the final 2 years of life. Our estimated dementia prevalence by age, race, and sex is presented in Table 2. We identified 31.5 percent of decedents as having dementia at the end of life, with a higher prevalence of dementia among older decedents ($p < .001$), among women ($p < .001$), and among blacks ($p < .001$).

Table 3 presents descriptive statistics on days of acute inpatient care and ICU care during the final 30 days of life. Compared with decedents without dementia, decedents with dementia on average received more days of acute inpatient care (6.7 versus 6.0, $p < .001$), but spent fewer days in the ICU (1.4 versus 1.8, $p < .001$). We also found that older decedents received less acute care near the end of life, compared with younger decedents. These patterns of

Table 1: Patient Demographics and Veterans Affairs (VA)-Medicare Dual-Use Patterns*

<i>Variable</i>	<i>Overall</i>	<i>With Dementia</i>	<i>Without Dementia</i>
<i>N</i>	169,036	53,257 (31.5%)	115,779 (68.5%)
Age groups			
67–74	33.1%	21.9%	38.2%
75–84	55.6%	60.5%	53.3%
85+	11.3%	17.5%	8.4%
Race			
White	85.1%	83.7%	85.7%
Black	11.9%	13.7%	11.1%
Other	2.6%	2.4%	2.7%
Unknown	0.4%	0.2%	0.5%
Sex			
Male	98.5%	98.2%	98.6%
Female	1.5%	1.8%	1.4%
VA-Medicare dual use [†]			
VA only	13.5%	8.6%	15.8%
VA and Medicare	86.5%	91.4%	84.2%

*Totals may not add to 100% because of rounding.

[†]All patients used VA care in the final 2 years of life. VA-Medicare dual use is defined as use of any Medicare services in the final 2 years of life.

Table 2: Estimated End-of-Life Dementia Prevalence by Age, Race, and Sex

<i>Variable</i>	<i>All Ages (N = 169,036) (%)</i>	<i>Age 67–74 (N = 55,949) (%)</i>	<i>Age 75–84 (N = 93,968) (%)</i>	<i>Age 85+ (N = 19,119) (%)</i>
Overall	31.5	20.9	34.3	48.9
By race				
White	31.0	20.1	33.8	48.3
Black	36.1	25.9	39.8	54.4
Other	29.2	19.8	32.2	46.2
Unknown	17.9	8.2	18.6	30.9
By sex				
Male	31.4	20.9	34.3	48.7
Female	37.2	18.8	36.5	55.4

utilization were also evident during the final 90 days of life and the final year of life (not shown).

Comparisons between VA and Medicare utilization at the patient level likely reveal more about patient dual-use patterns than about differences in practice patterns between the two systems. However, it is notable that the vast majority of these elderly VA users obtained at least some care through Medicare, and on average they received more acute care through the Medicare system at the end of life than through the VA system. Compared with patients who only used VA, dual-users were more likely to have dementia ($p < .001$), were older ($p < .001$), were more likely to be white ($p < .001$), and were slightly more likely to be male ($p < .01$) (not shown).

Table 4 and Figure 1 present the use of aggressive treatments per acute stay during the final 30 days of life, by dementia status and age. There were 122,740 acute stay discharges during the final 30 days of life, representing 94,100 unique patients (31,654 with dementia). Forty-five thousand three hundred and sixteen of these stays occurred in VA, and 77,424 were provided through Medicare. Overall, 55.7 percent of patients had at least one acute stay in the final 30 days of life, including 59.4 percent of patients with dementia, and 53.9 percent of patients without dementia (not shown). We found that across age groups and in both health care systems, patients with dementia were less likely to receive aggressive treatments during a given acute hospital stay, with a few exceptions in dialysis treatment. This general pattern was also evident during the final 90 days of life and the final year of life, again with dialysis providing the only exceptions (not shown).

For all ages combined, the overall differences in aggressive treatment use between VA and Medicare were significant at the .001 level for each

Table 3: Acute Inpatient Days and Intensive Care Unit (ICU) Days during the Last 30 Days of Life, by Dementia Status and Age

Variable	Overall					With Dementia					Without Dementia				
	All Ages (N =	67-74 (N =	75-84 (N =	85+ (N =	All Ages (N =	67-74 (N =	75-84 (N =	85+ (N =	All Ages (N =	67-74 (N =	75-84 (N =	85+ (N =	All Ages (N =	67-74 (N =	75-84 (N =
	169,036)	55,949)	93,968)	19,119)	53,257)	11,671)	32,241)	9,345)	115,779)	44,278)	61,727)	9,774)			
Acute inpatient days															
Total	6.2 (8.6)*	6.4 (8.9)	6.3 (8.6)	5.7 (8.0)	6.7 (8.7)	7.4 (9.3)	6.7 (8.7)	5.8 (7.9)	6.0 (8.6)	6.1 (8.7)	6.0 (8.5)	5.5 (8.1)			
VA	2.6 (6.6)	3.0 (7.0)	2.5 (6.4)	2.3 (6.1)	2.5 (6.4)	2.9 (7.0)	2.4 (6.3)	2.2 (5.7) [†]	2.7 (6.7)	3.0 (7.0)	2.5 (6.5)	2.4 (6.3) [†]			
Medicare	3.6 (6.9)	3.4 (6.9)	3.8 (7.1)	3.4 (6.4)	4.2 (7.4)	4.5 (7.8)	4.3 (7.4)	3.7 (6.6)	3.3 (6.7)	3.1 (6.6)	3.5 (6.9)	3.1 (6.3)			
ICU days															
Total	1.7 (4.6)	1.9 (5.0)	1.6 (4.6)	1.2 (3.8)	1.4 (4.2)	1.9 (5.0) [†]	1.4 (4.2)	1.0 (3.4)	1.8 (4.8)	1.9 (5.0) [†]	1.8 (4.7)	1.4 (4.1)			
VA	0.7 (3.1)	0.8 (3.5)	0.6 (2.9)	0.5 (2.5)	0.4 (2.5)	0.6 (3.0)	0.4 (2.3)	0.4 (2.1)	0.8 (3.3)	0.9 (3.6)	0.7 (3.2)	0.6 (2.8)			
Medicare	1.0 (3.6)	1.0 (3.8)	1.0 (3.6)	0.7 (2.9)	1.0 (3.6) [†]	1.2 (4.2)	1.0 (3.5)	0.7 (2.7)	1.0 (3.6) [†]	1.0 (3.7)	1.1 (3.7)	0.8 (3.2)			

*Mean (SD).

[†]The distributions were not significantly different between patients in this age group with and without dementia, using the Wilcoxon rank sum test and a $p = .05$ level of significance.

Table 4: VA and Medicare Aggressive Treatment Use per Acute Stay in the Last 30 Days of Life, by Dementia Status and Age

<i>Treatment</i>	<i>Overall</i>					<i>With Dementia</i>					<i>Without Dementia</i>				
	<i>All Ages</i> (<i>N</i> = 122,740)*	<i>67-74</i> (<i>N</i> = 40,728)	<i>75-84</i> (<i>N</i> = 68,690)	<i>85+</i> (<i>N</i> = 13,322)	(%)	<i>All Ages</i> (<i>N</i> = 41,428)	<i>67-74</i> (<i>N</i> = 9,538)	<i>75-84</i> (<i>N</i> = 25,074)	<i>85+</i> (<i>N</i> = 6,816)	(%)	<i>All Ages</i> (<i>N</i> = 81,312)	<i>67-74</i> (<i>N</i> = 31,190)	<i>75-84</i> (<i>N</i> = 43,616)	<i>85+</i> (<i>N</i> = 6,506)	(%)
Intensive care unit															
Combined	36.8 [†]	39.2	36.3	31.5		31.0	34.9	30.8	26.6		39.7	40.6	39.5	36.6	
VA	37.1	39.2	36.5	32.5		30.5	34.8	29.8	26.7		39.8	40.2	39.8	37.8	
Medicare	36.6	39.3	36.2	30.9		31.3	34.9	31.2	26.5		39.6	40.9	39.4	35.8	
Ventilator															
Combined	17.1	19.7	16.5	12.0		13.0	16.8	12.6	9.1		19.2	20.5	18.8	15.0	
VA	15.4	17.6	14.7	11.0		11.1	14.4	10.6	8.2		17.2	18.3	16.8	13.7	
Medicare	18.1	21.2	17.5	12.5		13.9	18.0	13.6	11.1		20.4	22.3	19.9	15.9	
Cardiac catheter															
Combined	2.6	2.9	2.6	1.2		1.1	1.4	1.1	0.4		3.3	3.4	3.5	2.2	
VA	1.7	2.0	1.6	0.8		0.6	0.8	0.6	0.3		2.1	2.3	2.1	1.4	
Medicare	3.1	3.6	3.1	1.5		1.3	1.7	1.4	0.4		4.1	4.3	4.2	2.7	
Pulmonary artery monitor															
Combined	2.6	3.1	2.5	1.5		1.4	1.8	1.4	0.8		3.2	3.6	3.1	2.2	
VA	3.4	4.1	3.2	1.8		1.8	2.4	1.8	1.1		4.0	4.4	3.9	2.4	
Medicare	2.1	2.5	2.1	1.3		1.2	1.4	1.2	0.7		2.6	2.9	2.6	2.1	
Dialysis															
Combined	4.6	5.7	4.3	2.2		3.9	6.2	3.7	1.8		4.9	5.5	4.7	2.5	
VA	3.8	4.8	3.5	1.9		2.8	4.7 [‡]	2.5	1.2		4.3	4.8 [‡]	4.0	2.5	
Medicare	5.0	6.3	4.8	2.4		4.5	6.9	4.2	2.2 [‡]		5.2	6.1	5.1	2.6 [‡]	

*Values for *N* are for Veterans Affairs (VA) and Medicare combined. Overall, there were 45,316 VA stays and 77,424 Medicare stays.

[†]Percentages represent the percent of acute stays in which the given aggressive treatment was utilized.

[‡]The percentages were not significantly different between patients in this age group with and without dementia, using a chi-square test and a $p = .05$ level of significance.

Figure 1: Overall Aggressive Treatment Use per Acute Stay in the Last 30 Days of Life, by Dementia Status and Age.

aggressive treatment except ICU admission, with a p -value of .067. All of these differences, including ICU admission, were significant at the .01 level after controlling for demographic and clinical factors in a probit regression.

Table 5 presents results from stay-level probit regressions of each aggressive treatment on dementia status, controlling for age group, sex, race, Charlson comorbidity score (excluding dementia diagnoses), and principal diagnosis for the stay. VA analyses also control for the number of ICU beds per 100,000 unique patients in the station where the stay occurred. Results are presented for VA, Medicare, and both systems combined; because the models control for age group, we do not break out results by age groups as in previous tables. The coefficients (dF/dx) represent the difference in likelihood of receiving the given aggressive treatment for a patient with dementia, compared

Table 5: Probit Results: Regressing Each Aggressive Treatment on Dementia Status and Covariates, for Veterans Affairs (VA) and Medicare Acute Stays in the Last 30 Days of Life*

<i>Dependent Variable</i>	<i>Observed P</i>	<i>dF/dx</i>	<i>SE</i>	<i>z</i>	<i>p > z </i>	<i>95% Confidence Interval</i>
Intensive care unit						
Combined	0.3677	-0.0746	0.0031	-24.04	<.001	-0.0806 to -0.0686
VA	0.3726	-0.0899	0.0054	-16.36	<.001	-0.1004 to -0.0794
Medicare	0.3657	-0.0672	0.0038	-17.64	<.001	-0.0745 to -0.0598
Ventilator						
Combined	0.1708	-0.0542	0.0022	-23.76	<.001	-0.0585 to -0.0500
VA	0.1551	-0.0571	0.0035	-15.05	<.001	-0.0641 to -0.0502
Medicare	0.1807	-0.0570	0.0028	-19.73	<.001	-0.0625 to -0.0516
Cardiac catheter						
Combined	0.0266	-0.0068	0.0005	-14.24	<.001	-0.0077 to -0.0059
VA	0.0179	-0.0048	0.0006	-7.17	<.001	-0.0061 to -0.0036
Medicare	0.0318	-0.0077	0.0006	-12.58	<.001	-0.0089 to -0.0065
Pulmonary artery monitor						
Combined	0.0258	-0.0137	0.0008	-15.94	<.001	-0.0152 to -0.0121
VA	0.0340	-0.0166	0.0015	-9.69	<.001	-0.0196 to -0.0136
Medicare	0.0215	-0.0114	0.0009	-11.47	<.001	-0.0132 to -0.0096
Dialysis						
Combined	0.0455	-0.0063	0.0010	-6.23	<.001	-0.0082 to -0.0043
VA	0.0392	-0.0090	0.0015	-5.77	<.001	-0.0119 to -0.0061
Medicare	0.0498	-0.0053	0.0013	-4.06	<.001	-0.0078 to -0.0028

*Reported results are for dementia status as the explanatory variable, controlling for age group, sex, race, Charlson comorbidity score (excluding dementia diagnoses), and principal diagnosis. VA analyses also control for the number of intensive care unit (ICU) beds per 100,000 unique patients in the station where the stay occurred. Observed *P* represents the percent of stays in which the given aggressive treatment was used, after excluding VA stays missing data on the number of ICU beds and any stays where one value of an independent variable perfectly predicts the dependent variable. *dF/dx* is the model's estimate of the change in probability of the dependent variable (the aggressive treatment) when changing a patient from not having dementia to having dementia, calculated at the means of the other independent variables. *z* and *p > |z|* are the test of the underlying coefficient being 0.

with a patient without dementia, at the means of the control variables. Note that results are reported in percentage points and not as percent differences. For example, the difference in overall ICU admission rates from Figure 1 would be reported as 8.7 percentage points, but this indicates that patients with dementia were 22 percent less likely than patients without dementia to be admitted into the ICU. Likewise, the difference in cardiac catheter use would be reported as a 2.2 percentage point difference and indicates that patients with dementia were 67 percent less likely to receive cardiac catheterization than patients without dementia.

In both systems, we found that after controlling for other factors, patients with dementia were substantially less likely to receive each of the aggressive treatments. At the means of the other independent variables, patients with dementia were 7.5 percentage points less likely to be admitted to the ICU (95 percent confidence interval [CI], 6.9–8.1; percent of stays with ICU admission = 36.8 percent), 5.4 percentage points less likely to be placed on a ventilator (95 percent CI, 5.0–5.9; percent of stays with ventilator use = 17.1 percent), 0.7 percentage points less likely to receive cardiac catheterization (95 percent CI, 0.6–0.8; percent of stays with cardiac catheterization = 2.7 percent), 1.4 percentage points less likely to receive pulmonary artery monitoring (95 percent CI, 1.2–1.5; percent of stays with pulmonary artery monitoring = 2.6 percent), and 0.6 percentage points less likely to receive dialysis (95 percent CI, 0.4–0.8; percent of stays with dialysis = 4.6 percent). We found similarly low levels of aggressive treatment for patients with dementia when including the final 90 days of life and the final year of life (not shown).

DISCUSSION

Our study demonstrated a substantial disparity between the aggressiveness of in-hospital, end-of-life care for patients with dementia compared with those without dementia. In the final 30 days of life, acute care patients with dementia were 7.5 percentage points less likely to be admitted to the ICU, calculated at the means of the control variables, and we observed similarly striking reductions in the use of four aggressive procedures.

However, our data do not contain information about patient or family preferences or advance directives, and even with such data the meaning of this disparity would likely remain unclear. Differences in the aggressiveness of care in some instances may be a result of the patient's own wishes, and it is certainly possible that persons with a known degenerative disorder, such as dementia, may be more likely to prepare advance directives limiting care than those without dementia. It is also possible that caregivers may prefer less aggressive care, or may be unwilling to subject their loved ones to the discomfort or pain that often accompanies more aggressive treatment. That being said, advance directives are often insufficiently specific to be applied to a given clinical situation, and decisions made by surrogates often do not accurately represent the wishes of the patient. Thus, it is difficult to determine the extent to which less aggressive treatment for persons with dementia can be considered appropriate or inappropriate. Given that the vast majority of elderly

persons and families of patients with dementia favor palliative care at the end stage of dementia (Gjerdingen et al. 1999), at least some of the difference we observed in aggressiveness of care is likely to be appropriate. It is open for debate whether greater or lesser reductions in aggressive care for patients with dementia might represent more appropriate patterns of care.

It is noteworthy that while this study found that persons with dementia received fewer aggressive services, other studies comparing those with and without dementia have typically found either similar rates of aggressive treatment or higher rates among patients with dementia (Ahronheim et al. 1996; Morrison and Siu 2000; Evers et al. 2002; Mitchell, Kiely, and Hamel 2004). There are a number of potential reasons for the difference between results of previous studies and our results. First, the study that found consistently higher rates of aggressive treatment among patients with dementia used patients with terminal cancer as a comparison group (Mitchell, Kiely, and Hamel 2004). Patients with terminal cancer are treated substantially less aggressively than other patients at the end of life (Levinsky et al. 2001), so our results are not directly comparable with those of Mitchell et al. The other three studies, which found either similar levels of aggressive care or mixed results, had no more than 303 subjects and may not have been sufficiently powered to detect differences that may have existed. Another potential reason for the difference in results compared with previous studies is that there have been varying definitions of what constitutes “aggressive care” at the end of life. A final possibility is that practice patterns for end-of-life treatment of patients with dementia have changed over time, moving toward favoring less aggressive care.

We identified 31.5 percent of patients as having dementia at the end of life. This rate is higher than that found in most studies of elderly populations (Moise, Schwarzinger, and Um 2004), but we are unaware of research into dementia prevalence rates among elderly decedents. Considering that most cases of dementia are chronic, we would expect higher rates among decedents than in the general population.

Our data showed that VA patients used more inpatient care through Medicare hospitals than VA hospitals near the end of life. This may be due to these patients accessing the nearest hospital for emergency care before death. However, hospital utilization rates in Medicare hospitals were also higher in the final 90 days and final year of their life, suggesting that the use of Medicare hospitals might be attributed to factors beyond those related specifically to emergency end-of-life care. This finding underscores the importance of including utilization data from both VA and Medicare for studies that involve dual-eligible veterans.

After controlling for other factors, we found higher rates of ventilator, cardiac catheter, and dialysis use in Medicare than in VA, and lower rates of pulmonary artery monitor use and ICU admission. Further research is warranted to determine whether these differences are caused by financial incentives, variations in practice patterns not related to financial incentives, or differential capture of the procedures in the Medicare and VA administrative databases.

This study has many strengths, including the large nationwide sample and the use of both VA and Medicare utilization databases, but some limitations should be noted. Our data were limited to administrative and claims data and failed to capture some information from clinical charts, such as the preferences of the subject or of a proxy, and whether or not the subject had an advance directive. Also, we used retrospective data on patients who died, but at the time of treatment it was unknown whether the patient was going to die. There are questions about the ability of physicians or computer models to predict death when it is very close, and this ability varies by disease (Lynn et al. 1997). If dementia patients in our sample were more predictably close to death than other patients, the observed treatment disparities may reflect the appropriate reduction of aggressive care for terminal patients. However, there is evidence that an elderly patient's chances of survival over days or months can be estimated with some confidence (Lemeshow et al. 1993; Knaus et al. 1995; Teno et al. 2000), and it is rare for elderly patients to experience sudden death (Lunney, Lynn, and Hogan 2002). Furthermore, there is evidence that patients with advanced dementia are rarely viewed by physicians as having a poor short-term prognosis (Morrison and Siu 2000; Mitchell, Kiely, and Hamel 2004).

In conclusion, in a national sample of veteran decedents, we found that patients with dementia were treated substantially less aggressively at the end of life than patients without dementia. There are a number of possible explanations for this result, and future work should address the appropriateness of these end-of-life treatment patterns.

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SUPPLEMENTARY MATERIAL

The following supplementary material for this article is available online:

APPENDIX 1. ICD-9-CM Codes Used to Identify Dementia.