Cost Savings Associated With US Hospital Palliative Care Consultation Programs

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Background: Hospital palliative care consultation teams have been shown to improve care for adults with serious illness. This study examined the effect of palliative care teams on hospital costs.

Methods: We analyzed administrative data from 8 hospitals with established palliative care programs for the years 2002 through 2004. Patients receiving palliative care were matched by propensity score to patients receiving usual care. Generalized linear models were estimated for costs per admission and per hospital day.

Results: Of the 2966 palliative care patients who were discharged alive, 2630 palliative care patients (89%) were matched to 18 427 usual care patients, and of the 2388 palliative care patients who died, 2278 (95%) were matched to 2124 usual care patients. The palliative care patients who were discharged alive had an adjusted net savings of $1696 in direct costs per admission ($P = .004$) and $279 in direct costs per day ($P < .001$) including significant reductions in laboratory and intensive care unit costs compared with usual care patients. The palliative care patients who died had an adjusted net savings of $4908 in direct costs per admission ($P = .003$) and $374 in direct costs per day ($P < .001$) including significant reductions in pharmacy, laboratory, and intensive care unit costs compared with usual care patients. Two confirmatory analyses were performed. Including mean costs per day before palliative care and before a comparable reference day for usual care patients in the propensity score models resulted in similar results. Estimating costs for palliative care patients assuming that they did not receive palliative care resulted in projected costs that were not significantly different from usual care costs.

Conclusion: Hospital palliative care consultation teams are associated with significant hospital cost savings.

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ADVANCES IN DISEASE PREVENTION, disease-modifying therapies, and medical technology in combination with the aging of the population have resulted in a dramatic growth in the number of adults living with serious illness.[1] Despite enormous expenditures, patients with serious illness receive poor quality medical care, characterized by untreated symptoms, unmet personal care needs, high caregiver burden, and low patient and family satisfaction.[2]

Palliative care is the interdisciplinary specialty that focuses on improving quality of life for patients with advanced illness and for their families through pain and symptom management, communication and support for medical decisions concordant with goals of care, and assurance of safe transitions between care settings.[3] Until a decade ago, palliative care in the United States was typically available only to patients living at home and enrolled in hospice. Now, palliative care programs targeting acutely ill patients are found increasingly in hospitals. As of 2005, 30% of US hospitals and 70% of hospitals with more than 250 beds reported the presence of a palliative care program—an increase of 96% from 2000.[4] Unlike hospice, hospital palliative care is provided simultaneously with all other appropriate disease-directed treatments.[3]

Hospital palliative care programs have been shown to improve physical and psychological symptom management, caregiver well-being, and family satisfaction,[2,5-9] and small, single-site studies suggest that palliative care programs may reduce hospital and intensive care unit (ICU) expenditures by clarifying goals of care and assisting patients and families to select treatments that meet those goals.[10-15] This study was undertaken to estimate the effect of palliative care consultation programs on hospital costs.

METHODS

We used hospital administrative data to compare hospital costs of patients receiving palliative care consultation matched by propensity score[16-18] with patients receiving usual care from 2002 through 2004.

Table 1. Characteristics and Structures of Study Sites and Palliative Care Teams

Variable	Hospital[a] A	B	C	D	E	F	G	H
Hospital type	Com	Com	Acd	Com	Com	Com	Acd	Acd
No. of hospital beds	348	807	434	330	220	336	574	976
No. of admissions, y								
2002	13 342	27 379	19 921	17 645	14 916	22 463	20 302	38 849
2003	13 043	27 532	21 012	18 648	16 764	22 229	20 481	39 521
2004	12 905	27 423	22 564	22 618	19 280	20 787	22 096	40 730
No. of deaths, y								
2002	474	438	557	613	313	682	549	1082
2003	406	397	547	614	351	691	527	1063
2004	372	398	570	709	430	584	547	1060
No. of Medicare admissions, y								
2002	7871	6078	6693	5927	2958	6593	7308	15 153
2003	7434	6042	7144	6434	3557	6631	7351	16 055
2004	7355	6158	7672	7542	3961	6202	7950	16 815
Palliative care consultation team composition	1.0 MD 1.0 RN 1.0 SW 1.0 Chapl	2.0 MD 1.5 ANP 0.5 SW 1.0 Chapl	3.0 MD 3.0 RN 1.0 Psych 3.0 MD	1.0 MD 1.0 ANP 0.1 SW	1.0 MD 1.0 RNC 0.6 NP 0.1 SW	1.0 MD 1.0 RNC 0.1 SW	1.0 MD 0.1 RN 1.0 SW 0.1 PharmD 0.3 Chapl	2.0 MD 2.0 NP 1.0 SW

Abbreviations: Acd, academic medical center; ANP, adult nurse practitioner; Chapl, chaplain; Com, community hospital; MD, doctor of medicine; Psych, psychologist; NP, nurse practitioner; PharmD, doctor of pharmacy; RN, registered nurse; RNC, registered nurse clinician; SW, social worker.

[a]A, Central Baptist Hospital, Lexington, Kentucky; B, University of Minnesota Medical Center, Fairview, Minneapolis; C, Froedtert Hospital, Milwaukee, Wisconsin; D, Mount Carmel Hospital East, Columbus, Ohio; E, Mount Carmel Hospital West, Columbus; F, Mount Carmel St Ann's Hospital, Columbus; G, UCSF Medical Center, San Francisco, California; H, Mount Sinai Hospital, New York, New York.

SAMPLE

Eight geographically and structurally diverse hospitals representing low-, middle-, and high-cost markets served by 6 mature palliative care consultation teams (1 team served 3 hospitals) were included (**Table 1**). For the main analyses, the patient sample included all patients 18 years or older who had lengths of stay of 7 to 30 days. We excluded patients with short lengths of stay because these patients were unlikely to receive palliative care consultation. Patients with lengths of stay of more than 30 days were excluded because they represented outliers that were unlikely to be generalizable. Patients receiving palliative care were identified through the palliative care consultation teams' administrative databases and billing records. The initial sample included 43 973 patients discharged alive and 4726 patients who died in hospital.

PATIENT FACTORS

We used hospital databases to abstract patient characteristics. Medical comorbidities were determined using the Elixhauser algorithm that includes 30 categories of comorbid illnesses identified by secondary diagnosis codes and discharge diagnosis-related groups.[19]

COSTS

Costs were abstracted from the hospitals' cost accounting systems. Each hospital used the same system, TSI (Transitions Systems Inc, Boston, Massachusetts). TSI tracks all hospital resources and assigns cost (not charge) values to these resources. These estimates are based on direct acquisition costs for supplies and time-and-motion studies for labor costs.[20] Various procedures are also used to determine the proportion of other costs, such as plant costs (eg, lighting and heating), that should be applied to each resource. This approach is generally considered the most accurate method to estimate costs.[20] We abstracted direct and total costs for each subject for each hospital day and for the entire admission. Direct costs are costs that can be directly attributable to medications, procedures, or services. Indirect costs are the general costs of running a hospital that are not directly related to the test or service. Total costs are the sum of direct and indirect costs. We used Uniform Billing 92 codes to aggregate direct costs into specific categories that included the following: ICU, pharmacy and intravenous therapy, laboratory, and diagnostic imaging costs.[21] All costs were converted into 2004 US dollars.

ANALYSES

Subjects were stratified by hospital site and then within each hospital into 2 strata comprising live discharges and hospital deaths. We computed propensity scores for each subject within each stratum.[16-18,22] Propensity scores were determined by regressing whether patients received palliative care consultation on all patient characteristics present at hospital admission listed in the hospital databases. These variables included patient age, sex, marital status, medical insurance, primary diagnosis, attending physician specialty, and Elixhauser comorbidity score. Within each stratum we matched each patient receiving palliative care consultation with 1 or more usual care patients whose logit of their propensity score was within ±0.05 standard deviations of the logit of the palliative care patient's score. Unmatched patients were excluded, and all subsequent analyses included matched live discharges and matched hospital deaths.

Bivariate comparisons of unadjusted per diem costs and patient demographics were examined using unpaired *t* tests and χ^2 tests as appropriate. Usual care patients' data were weighted to account for the one-to-many propensity score matching algorithm. Generalized linear models (GLMs) using normalized weighted data were estimated for total and direct costs per hospital admission and hospital day. In addition, we estimated GLMs for pharmacy, diagnostic imaging, laboratory test, and ICU direct costs for all usual care patients admitted to an ICU and for

patients receiving palliative care consultation prior to ICU discharge. The GLMs were specified as having a gamma distribution and log link.[23,24] The dependent variable was cost, and the independent variables included patient age, principal diagnosis, comorbidity score, palliative care team, attending physician specialty, marital status, insurance type, hospital discharge site for live discharges, and the key independent variable, whether the patient received palliative care consultation. Each cost model was adjusted for clustering by hospital. The GLM was used to examine the effects of palliative care consultation on hospital length of stay in days controlling for the aforementioned covariates.

ADDITIONAL CONFIRMATORY ANALYSES

We performed 2 additional confirmatory analyses. We matched usual care and palliative care patients by intensity of medical services before palliative care consultation to confirm that the palliative care and usual care groups were well matched. This analysis was performed by developing propensity scores using mean direct daily costs before consultation (palliative care patients) and before a corresponding reference day (usual care) as a regressor in the propensity score models. The reference day for usual care patients was hospital day 6 for patients with lengths of stay of 10 days or less, day 10 for those with lengths of stay of 11 to 20 days, and day 18 for those with lengths of stay longer than 20 days. These reference days represented the average day of consultation for palliative care patients for lengths of stay within these 3 categories. The GLMs were used to estimate costs for the usual care and palliative care patients.

We also used the GLM to model costs up to the day before consultation for palliative care patients. We then used these models to predict hypothetical costs in the absence of a palliative care consultation for the remaining length of stay, assuming that the slope of the cost curves remained constant, as was actually observed for usual care patients. We compared these predicted costs to actual costs for palliative care patients.

All analyses were performed with Stata version 9.2 statistical software (StataCorp, College Station, Texas), and this study was approved by the institutional review boards of all sites.

RESULTS

Of the 2966 patients who received palliative care consultation and who were discharged alive, 2630 (89%) were matched to 18 427 usual care patients discharged alive, and of the 2388 palliative care patients who died in hospital, 2278 (95%) were matched to 2124 usual care patients who died in hospital (**Table 2** and **Table 3**). There were no statistically significant differences in length of stay between usual care and palliative care patients discharged alive (12.4 vs 13.1 days; $P=.12$) and those who died in hospital (13.9 vs 14.1 days; $P=.40$).

COSTS FOR PATIENTS DISCHARGED ALIVE

Patients receiving palliative care consultation had significantly lower costs than usual care patients. For patients discharged alive, palliative care consultation was associated with adjusted net savings in total costs of $2642 per admission ($P=.02$) and $279 per day ($P<.001$) compared with usual care. Adjusted net savings in direct costs associated with palliative care were $1696 per admission ($P=.004$) and $174 per day ($P<.001$). These savings included significant reductions in laboratory costs ($424 per admission; $P<.001$) and ICU costs ($5178 per ICU admission; $P<.001$) (**Table 4**). Including outlier patients—those with lengths of stay less than 7 days and longer than 30 days—resulted in reductions in direct costs per day of $275 and $246, respectively, favoring palliative care.

COSTS FOR PATIENTS WHO DIED IN HOSPITAL

For patients who died in hospital, palliative care consultation was associated with adjusted net savings in total costs of $6896 per admission ($P=.001$) and $549 per day ($P<.001$). Adjusted net savings in direct costs were $4908 per admission ($P=.003$) and $374 per day ($P<.001$). These reductions in direct costs included significant reductions in pharmacy costs ($1544 per admission; $P=.04$), laboratory tests ($926 per admission; $P<.001$), and ICU costs ($6613 per ICU admission; $P<.001$) (Table 4). Including outlier patients—those with lengths of stay less than 7 days and longer than 30 days—resulted in reductions in direct costs per day of $559 and $370, respectively, favoring palliative care.

CONFIRMATORY ANALYSES

Including mean cost per day before palliative care consultation and before the reference day for usual care subjects in the propensity score models as a surrogate for intensity of medical services resulted in qualitatively similar results (ie, the parameter estimates were contained within the 95% confidence intervals of the estimates of the primary analyses) across all major cost categories albeit with fewer matched subjects (78% of palliative care patients discharged alive could be matched to a usual care patient and 92% of palliative care patients who died could be matched to a usual care patient).

Figure 1 displays mean daily direct costs for live discharges and hospital deaths. For palliative care patients, we plotted the 6 days before and after palliative care consultation (day 0). For usual care patients, day 0 was the reference day established for the confirmatory analyses previously described. There were no significant differences observed between the cost curves' slopes or the mean daily direct costs for palliative care and matched usual care groups before the day of consultation (palliative care patients) or the reference day (usual care patients). Whereas the slope of the usual care cost curve approached zero following the reference day, palliative care consultation was associated with a significant reduction in hospital costs 24 to 48 hours after consultation. For patients discharged alive (Figure 1A), mean direct costs per day decreased from $843 for the 48 hours before palliative care consultation to $605 for the 48 hours after consultation ($P=.001$) and from $1163 for the 48 hours before consultation to $589 for the 48 hours after consultation ($P=.003$) for patients who died (Figure 1B).

We projected what the adjusted direct costs per admission for palliative care patients would have been if they had not received palliative care consultation. Projected direct costs per admission were $11 787 for patients discharged alive and $22 301 for patients who died in hospital. These projected costs were not significantly

Table 2. Demographics and Characteristics of Patients Discharged Alive From the Hospital

Variable	Weighted Value: Usual Care Patients (n=18 427)	Weighted Value: Matched Palliative Care Patients (n=2630)	*P* Value	Nonweighted Value: Unmatched Palliative Care Patients (n=306)
Age, mean (range), y	68.07 (18-106)	68.2 (18-104)	.78	71.2 (18-99)
Men, %	41.8	41.19	.90	47.1
Married, %	42.0	41.7	.52	41.3
Insurance, %				
Medicare	69.4	69.4	.21	73.9
Medicaid	9.7	11.2		7.8
Managed care	16.4	15.7		14.2
Indemnity plan	3.2	2.4		1.0
Other	1.4	1.3		3.2
Principal diagnosis, %				
Cancer	28.4	28.9	.90	36.8
Infection	4.4	4.3		3.3
Cardiovascular	18.9	18.6		17.8
Pulmonary	15.8	15.4		16.8
Gastrointestinal	6.7	7.2		6.2
Genitourinary	4.4	3.8		4.1
Other	21.4	21.9		15.2
Comorbidities, mean (range), No.	2.6 (0-10)	2.6 (0-11)	.86	3.0 (0-9)
Physician specialty, %				
Internal medicine	69.4	67.0	.96	74.2
Oncology	12.7	14.9		13.9
Surgery	12.7	12.9		7.7
Other	5.2	5.2		4.3
Admitted to ICU, %	38.6	37.5	.43	50.3
Discharge destination, %				
Home	67.4	56.3	<.001	58.2
Nursing home	25.7	38.1		37.5
Other	6.9	5.6		4.3
Hospital, %[a]				
Hospital A	12.6	12.6	.99	3.4
Hospital B	6.8	6.8		1.7
Hospital C	13.0	13.0		5.3
Hospital D	14.3	14.3		85.6
Hospital E	18.2	18.3		1.3
Hospital F	9.3	9.3		1.4
Hospital G	2.3	2.3		0.7
Hospital H	23.5	23.5		0.5
Days receiving palliative care, mean (range)	NA	6.5 (1-29)	NA	7.2 (1-28)

Abbreviations: ICU, intensive care unit; NA, not applicable.
[a]For a description of hospitals, see Table 1 footnote.

different from the costs actually observed in the usual care group ($11 140 [*P*=.26] for live discharges and $22 674 [*P*=.44] for deceased patients).

Finally, to explore the question of whether the recommendations of the palliative care consultation teams reduced hospital costs or were simply a marker of changes in treatment plans already implemented by the primary care team, we plotted mean direct costs for each day of admission for usual care patients and for patients receiving palliative care consultation on hospital days 7, 10, and 15 for patients who died (**Figure 2**). Costs for patients who received palliative care were no different from those in the usual care group until 24 to 48 hours after palliative care consultation at which time costs in the palliative care group started to decrease. A similar pattern was observed for patients discharged alive (data not shown).

COMMENT

Studies have consistently demonstrated that patients with life-threatening illness experience untreated pain and other symptoms; lengthy hospitalizations involving unwanted, often low-yield and costly medical treatments; and low overall family satisfaction.[2,9,25-27] Hospital palliative care consultation programs have been associated with reductions in symptoms and higher family satisfaction with overall care, and greater emotional support as compared with usual care.[2,6,28,29] Although others have postulated that palliative care programs could substantially reduce hospital costs,[26,30] this study is the first, to our knowledge, to empirically evaluate the actual effect of palliative care on US hospi-

Table 3. Demographics and Characteristics of Patients Who Died in the Hospital

Variable	Weighted Value: Usual Care Patients (n=2124)	Weighted Value: Matched Palliative Care Patients (n=2278)	*P* Value	Nonweighted Value: Unmatched Palliative Care Patients (n=110)
Age, mean (range), y	71.7 (18-103)	71.6 (19-104)	.82	68.8 (19-100)
Men, %	48.4	48.1	.79	47.1
Married, %	43.9	44.0	.97	50.0
Insurance, %				
Medicare	74.9	75.6		69.0
Medicaid	8.6	8.4		7.3
Managed care	12.6	12.2	.99	7.3
Indemnity plan	2.8	2.8		4.4
Other	1.0	1.0		11.8
Principal diagnosis				
Cancer	19.3	19.0		23.5
Infection	11.5	11.3		2.0
Cardiovascular	24.8	24.3		27.9
Pulmonary	17.6	18.3	.99	16.0
Gastrointestinal	9.0	9.0		8.8
Genitourinary	3.7	3.9		4.4
Other	14.2	14.2		16.1
Comorbidities, mean (range), No.	2.9 (0-9)	2.9 (0-10)	.98	2.5 (0-7)
Physician specialty, %				
Internal medicine	74.8	74.8		32.0
Oncology	8.8	8.8	.96	10.0
Surgery	13.2	13.0		8.0
Other	3.2	3.4		50.0
Admitted to ICU, %	74.2	68.3	<.001	60
Hospital, %[a]				
Hospital A	5.4	5.4		0
Hospital B	3.0	3.0		4.4
Hospital C	11.4	11.4		11.8
Hospital D	19.7	19.7	.99	39.7
Hospital E	18.0	18.0		20.6
Hospital F	11.1	11.1		5.9
Hospital G	10.0	10.0		5.9
Hospital H	21.3	21.3		11.8
Days receiving palliative care, mean (range)	NA	4.8 (1-28)	NA	3.9 (0-15)

Abbreviations: ICU, intensive care unit; NA, not applicable.
[a]For a description of hospitals, see Table 1 footnote.

Table 4. Adjusted Costs for Live Discharges and Hospital Deaths

Cost	Live Discharges: Usual Care (95% CI), $	Live Discharges: Palliative Care (95% CI), $	Live Discharges: Net Δ	Live Discharges: *P* Value	Hospital Deaths: Usual Care (95% CI), $	Hospital Deaths: Palliative Care (95% CI), %	Hospital Deaths: Net Δ	Hospital Deaths: *P* Value
Total costs admission	19 379 (18 984-19 773)	16 737 (15 546-17 927)	−2642	.02	37 391 (34 952-39 830)	30 494 (28 414-32 575)	−6896	.001
Total costs per day	1450 (1430-1470)	1171 (1082-1260)	−279	<.001	2468 (2332-2603)	1918 (1787-2050)	−549	<.001
Direct costs per admission	11 140 (10 884-11 395)	9445 (8761-10 126)	−1696	.004	22 674 (20 871-24 477)	17 765 (16 201-19 330)	−4908	.003
Direct costs per day	830 (815-846)	656 (588-723)	−174	<.001	1484 (1391-1577)	1110 (1029-1191)	−374	<.001
Laboratory costs	1227 (1185-1268)	803 (712-893)	−424	<.001	2765 (2443-3086)	1838 (1588-2088)	−926	<.001
ICU costs	7096 (5801-8390)	1917 (1646-2187)	−5178	<.001	14 542 (13 685-15 399)	7929 (7181-8676)	−6613	<.001
Pharmacy costs	2190 (2116-2265)	2001 (1821-2180)	−190	.12	5625 (4890-6361)	4081 (3530-4632)	−1544	.04
Imaging costs	890 (868-913)	949 (884-1014)	58	.52	1673 (1563-1782)	1540 (1433-1646)	−133	.21

Abbreviations: CI, confidence interval; ICU, intensive care unit.

tal costs using a sample size sufficient to assure reliable results, using propensity score–matched control patients and enrolling patients from 8 diverse hospitals serving low-, medium-, and high-cost markets, thus enhancing the generalizability of our results. Our finding that palliative care consultation is associated with

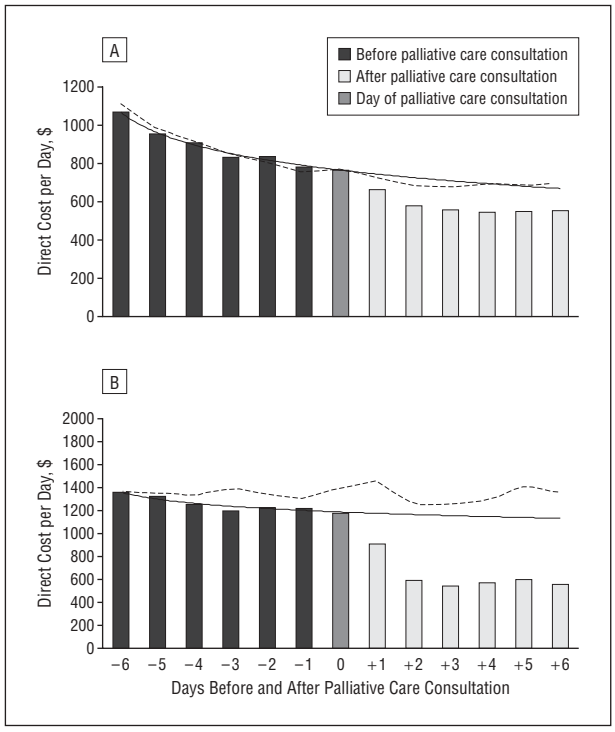

Figure 1. Mean direct costs per day for palliative care patients who were discharged alive (A) or died (B) before and after palliative care consultation. The solid line represents the regression curve of actual costs before palliative care consultation (day 0) and estimated costs (days 1-6) assuming that palliative care consultation had not occurred. The dashed line represents direct costs per day for usual care patients for the 6 days before and after hospital day 6 (patients with lengths of stay of ≤10 days), hospital day 10 (for patients with lengths of stay of 11-20 days), or hospital day 18 (for patients with lengths of stay of >20 days).

significant reductions in hospital costs has important implications for hospitals and policy makers.

OTHER FACTORS THAT COULD ACCOUNT FOR THE OBSERVED SAVINGS

It is possible that the cost saving observed might have occurred spontaneously without the palliative care consultation team's intervention due to unmeasured confounding variables that we were unable to obtain from administrative data. Specifically, it is possible that before the palliative care consultation, physicians recommended and patients agreed to forego some therapies and that the palliative care team enacted a previously decided-on care plan. Data suggest that this is unlikely. Although this study was a retrospective analysis, 3 of the participating palliative care teams have reported that most palliative care consultations are requested to help address goals of care and to discuss with patients all treatment options, including that of foregoing treatments that will not meet their goals or prolong life in a meaningful fashion.[12,31,32] Other studies lend credence to this argument. The study to understand prognoses and preferences for outcomes and risks of treatments (SUPPORT), which included more than 9000 seriously ill adults, demonstrated that patient preferences and physicians' knowledge of patients' preferences and prognoses did not have a measurable effect on hospital costs and treatments.[25]

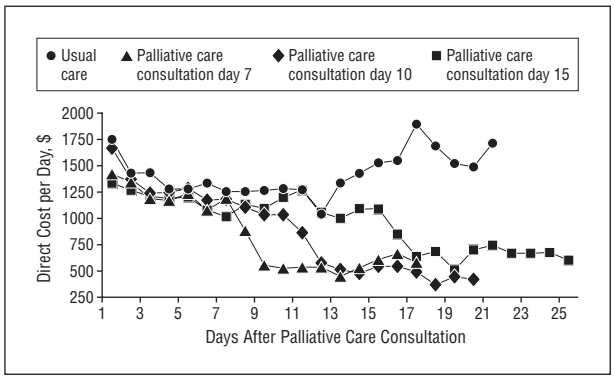

Figure 2. Mean direct costs per day for patients who died and who received palliative care consultation on hospital days 7, 10, and 15 compared with mean direct costs for usual care patients matched by propensity score. Hospital day 1 is the first full day after the day of admission.

Our data suggest that it was the actions of the palliative care teams that resulted in cost reductions. First, we found no significant differences in the palliative care and usual care groups across all observable patient characteristics, suggesting that the 2 groups were well matched. Second, as shown in Figure 1 and Figure 2, the decrease in costs consistently occurred 48 hours after consultation—no matter when the consultation occurred—and no corresponding decline was observed in the usual care group at any point in their hospital stay. If palliative care was only a marker for change, we would have expected the cost curves to drop before or at the time of consultation rather than be delayed for 48 hours, as was observed. Finally, our confirmatory analyses replicated our main findings. Specifically, including mean cost per day before palliative care consultation or the equivalent reference day for usual care patients as a surrogate for intensity of medical services in the propensity score analyses resulted in almost identical results. A comparison of the actual costs for palliative care patients after palliative care consultation with estimated costs in the case that palliative care consultation had hypothetically not occurred also resulted in almost identical savings.

WHAT ACCOUNTS FOR THE COST SAVINGS?

While it may appear self-evident that discontinuing costly nonbeneficial interventions among seriously ill patients reduces hospital costs, such a fundamental shift in the usual hospital care pathway is neither a simple nor straightforward process, given the highly patterned treatment culture of the US hospital, which is structured to prolong life and avert death at all costs. In this context, the fact that palliative care consultation appeared to consistently influence this process is an important finding. Indeed, prior studies have definitively demonstrated that even when seriously ill patients' preferences for treatments focused solely on comfort are documented and known by their physicians, these patients continue to receive low-yield, burdensome, and high-cost tests and treatments including prolonged ICU stays—a probable result of highly ingrained physician and hospital practice patterns and prevailing hospital culture.[25] Our data suggest that palliative care consultation fundamentally shifts the course of care off the usual hospital pathway and in doing so, sig-

nificantly reduces costs. This shift is likely accomplished by establishing clear treatment goals, reviewing current treatments to establish their concordance with these goals, and recommending and legitimizing discontinuation of treatments or tests that do not meet established goals.

RELATIONSHIP TO OTHER STUDIES

Our data confirm and extend previously published small single-site studies. Two studies performed at Department of Veterans Affairs (VA) medical centers reported reduced health care utilization and costs associated with palliative care programs.[10,11] Outside the VA, Cowan[33] reported reduced charges associated with a palliative care consultation team in a community hospital; Elsayem and colleagues[13] reported reduced charges associated with a palliative care inpatient unit in a cancer hospital; and Campbell and Frank[34] and Norton and colleagues[14] demonstrated reductions in ICU resource utilization associated with an ICU-based palliative care team. Two single site studies have looked at non-VA overall hospital costs. Smith and colleagues[12] found significantly lower costs for patients who died in an inpatient palliative care unit compared with matched controls who died in other hospital units, and Ciemens and colleagues[15] observed similar findings associated with a palliative care consultation service.

Our study has several strengths compared with these studies. We included data from 8 geographically and structurally diverse hospitals but with similarly structured palliative care consultation teams—now the standard of palliative care practice in US hospitals—thus enhancing the generalizability of our results. Prior studies used highly variable models of care and interventions that are neither comparable nor replicable. We used hospital costs rather than charges and thus our results reflect true rather than estimated savings. Finally, our estimates of savings per day may be conservative because the main analyses did not include patients with a length of stay longer than 30 days. The inclusion of outliers resulted in even greater savings.

IMPLICATIONS

Our results provide strong fiscal incentives for hospitals and policy makers to develop or expand palliative care consultation programs—programs that have already been demonstrated to improve quality and patient and family satisfaction. The most medically complex patients, such as the patients enrolled in this study, account for a growing proportion of admissions, bed days, and use of hospital resources. The median operating margin for a hospital is 2% ($27-$40 per day),[35] thus the $174-per-day savings in direct costs for live discharges associated with palliative care consultation in this study could have a significant impact on hospital performance, particularly as the proportion of older, complex, and chronically ill admissions increases over the coming years. Whether a hospital is paid on a diagnosis-related group or a per diem basis, they benefit from the lower costs. As the proportion of discounted fee for service patients continues to dwindle, this is of increasing importance.[36]

Hospital palliative care programs are also likely to help reduce Medicare expenditures. Five percent of Medicare enrollees with the most serious illness account for over 43% of Medicare expenditures, with the top 25% of enrollees accounting for 85% of the costs.[37] Three-quarters of these 25% of "highest cost" enrollees have at least 1 hospital admission per year, and approximately 60% of total Medicare health care expenditures are for hospital care.[37,38] Expansion of palliative care consultation programs to adequately serve the complex patient base of hospitals reduces cost pressures between hospitals and Medicare. Discharge orders and care plans resulting from palliative care consultations may also reduce ongoing care costs in the outpatient arena.

LIMITATIONS

This was not a randomized trial, and it is possible that the cost differences resulted from unmeasured differences between the 2 groups. We used several design and analytic measures to limit bias and confounding. First, we included subjects with a defined length of stay to eliminate the effects of outliers. Second, we stratified our sample both by site and by vital status prior to propensity score matching to minimize unobserved confounders. Third, we used propensity score methods to match patients based on patient characteristics to balance observed covariates and cannot draw conclusions about unmatched patients. However, the numbers of unmatched palliative care patients were relatively small (11% of patients discharged alive and 5% of patients who died). Finally, we used appropriate multivariable techniques to control for non–patient-based characteristics. Thus, although possible, we believe that it is unlikely that the magnitude of the effects noted here could be due to persistent unobserved confounders such as patient or physician preferences. Specifically, if patient preferences or another unmeasured variable were confounding our results, the parameter estimate would need to be several orders of magnitude larger than that observed in SUPPORT for us to have obtained these results, given the effects sizes observed in our models.[25]

CONCLUSIONS

This study found that palliative care consultation was associated with a reduction in direct hospital costs of almost $1700 per admission ($174 per day) for live discharges and of almost $5000 per admission ($374 per day) for patients who died. For an average 400-bed hospital containing an interdisciplinary palliative care team seeing 500 patients a year (300 live discharges and 200 hospital deaths), these figures translate into a net savings of $1.3 million per year after adding physician revenues ($240 000) and subtracting personnel costs ($418 000).[39] This study adds to the growing literature on the benefits of palliative care consultation by demonstrating that in addition to improved clinical care and patient, family, and physician satisfaction, these programs are associated with considerable reductions in hospital costs. The growth of the number of adults living with advanced and complex chronic illnesses, the documented inadequacies in care quality, and the increases in expenditures highlight the need for efficient models such as palliative care consultation teams that deliver quality services to complex patient populations.

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