Published in final edited form as:

J Pain Symptom Manage. 2016 October ; 52(4): 507–514. doi:10.1016/j.jpainsymman.2016.04.005.

Palliative Care Specialist Consultation Is Associated with Supportive Care Quality in Advanced Cancer

Anne M. Walling, MD, PhD, **Diana Tisnado, PhD**, **Susan L. Ettner, PhD**, **Steven M. Asch, MD, MPH**, **Sydney M Dy, MD**, **Philip Pantoja, MA**, **Martin Lee, PhD**, **Sangeeta C. Ahluwalia, PhD**, **Hannah Schreibeis-Baum, MPH**, **Jennifer L. Malin, MD, PhD**, and **Karl A. Lorenz, MD, MSHS**

Greater Los Angeles Veterans Affairs Healthcare System (A.M.W., D.T., S.L.E., M.L., H.S.-B., J.L.M., K.A.L.), Los Angeles; Division of General Internal Medicine and Health Services Research (A.M.W.), David Geffen School of Medicine at University of California, Los Angeles; RAND Health (A.M.W., P.P., S.C.A.), Santa Monica; Department of Health Science (D.T.), California State University, Fullerton; Department of Health Policy and Management (S.L.E., S.C.A.), Jonathan and Karin Fielding School of Public Health at UCLA, Los Angeles; VA Palo Alto Healthcare System (S.M.A.), Palo Alto; Stanford School of Medicine (S.M.A.), Stanford, California; and The Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins (S.M.D.), Baltimore, Maryland, USA

Abstract

Context—Although recent randomized controlled trials support early palliative care for patients with advanced cancer, the specific processes of care associated with these findings and whether these improvements can be replicated in the broader health care system is uncertain.

Objectives—Evaluate the occurrence of palliative care consultation and its association with specific processes of supportive care in a national cohort of Veterans using the Cancer Quality ASSIST (Assessing Symptoms Side Effects and Indicators of Supportive Treatment) measures.

Methods—We abstracted data from 719 patients' medical records diagnosed with advanced lung, colorectal, or pancreatic cancer in 2008 over a period of three years or until death who received care in the Veterans Affairs Health System (VA) to evaluate the association of palliative care specialty consultation with the quality of supportive care overall and by domain using a multivariate regression model.

Results—All but 54 of 719 patients died within three years and 293 received at least one palliative care consult. Patients evaluated by a palliative care specialist at diagnosis scored sevem

---

Address correspondence to: Anne M. Walling, MD, PhD, VA Greater Los Angeles Healthcare System, 911 Broxton Avenue, Los Angeles, CA 90095, USA, awalling@mednet.ucla.edu.

Disclosures

Drs. Walling, Tisnado, Ettner, Asch, Dy, Lee, Ahluwalia, Hannah Schreibeis-Baum and Philip Pantoja do not have any relevant financial interests, activities, or relationships within the past 3 years to report. Dr. Malin is employed by and has stock ownership with WellPoint. Dr. Lorenz is serving as a consultant to Otsuka Pharmaceuticals for data monitoring and safety in the evaluation of a Phase II trial of Sativex, a novel cannabanoid analgesic.

percentage points higher overall ($P < 0.001$) and 11 percentage points higher ($P<0.001$) within the information and care planning domain compared to patients without a consult.

Conclusion—Early palliative care specialist consultation is associated with better quality of supportive care in three advanced cancers, predominantly driven by improvements in information and care planning. This study supports the effectiveness of early palliative care consultation in three common advanced cancers within the VA and provides a greater understanding of what care processes palliative care teams influence.

Keywords

Advanced cancer; quality; palliative care

Introduction

Recent clinical trials and observational studies have associated palliative care with better quality of life for patients, better caregiver outcomes, less aggressive treatments at the end of life, and a lower cost of care, but these findings have not yet been bolstered by studies of palliative care effectiveness in real world settings (1–10). A widely cited study by Temel et al. is consistent with a decade of previous research (8,10) and showed that palliative care consultation was associated with improved quality of life among patients newly diagnosed with metastatic non-small cell lung cancer in addition to prolonged survival. These findings supported the American Society of Clinical Oncology’s (ASCO) recommendation to integrate early palliative care alongside standard oncology care (11).

Aspects of the various domains of supportive care can and should be delivered by any providers caring for patients with advanced cancer. However, studies including Temel et al. suggest that involvement of palliative care specialists may improve the experience of care. We wanted to understand the specific improvements in key aspects of supportive care such as symptom management and information and care planning when specialist palliative care providers were engaged in Veterans’ care to inform models of palliative care delivery in oncology practice.

Given its investment in palliative care specialty teams, the VA provides a unique opportunity in which to understand the impact of these services, so building on previous efficacy research, we evaluated the impact of early palliative care consultation on the quality of supportive care for Veterans with advanced cancer in the Department of Veterans Affairs (VA). The VA is one of a handful of health care systems that invested in widespread palliative care access during the previous decade. The VA’s Comprehensive End of Life Care (CELC) initiative (2008–2011) implemented palliative care consultation as well as a bereaved family survey to provide an outcome measure of end-of-life experience for all Veterans. The VA met these goals using a parsimonious staffing model that is informative given the palliative care workforce shortages organizations currently confront in building clinical services.

Building on our team’s recent work (17), we hypothesized that patients who received early palliative care consultation would receive higher quality supportive care quality overall.

Because previous research and in-depth analysis of the widely cited Temel study support the centrality of communication and psychosocial support in understanding the efficacy of palliative care (13), we focused on specific domains (Information and Care Planning, Pain, and Non-Pain Symptoms) of supportive care processes, and we hypothesized that better information and care planning would be associated with palliative care consultation.

Methods

Study Design and Hypothesis

We used a retrospective cohort observational study design to study the relationship between palliative care consultation and supportive care quality as measured by Cancer Quality-Assessing Symptoms and Side Effects of Supportive Treatment (ASSIST) quality measures. We studied the quality of supportive care among a national cohort of Veterans diagnosed with advanced cancer in 2008 over the period of 3 years or until death, and we extensively described our methods including the development and characterization of the ASSIST measures using chart abstraction, cohort selection, administrative data sources, and study variables in previous publications (17,27,28). For the current analyses, we characterized basic information about frequency, location and timing of palliative care specialty consultation and then evaluated our hypothesis using multivariate regression and advanced statistical methods. Data management and descriptive analyses were performed using SAS software (v. 9.3; SAS Institute, Cary, NC), and modeling was conducted in Stata 12 (StataCorp LP, College Station, TX). The VA Greater Los Angeles Healthcare System institutional review board approved the study.

Multivariable Regression

We conducted standard ordinary least squares (OLS) regression controlling for variables pre-specified as important to the of quality supportive care. For the main independent variable, we created a variable for the proportion of time the patient with advanced care received palliative care informed by palliative care specialty consultation. This was created by taking the number of days from first palliative care consult until death or end of study divided by number of days from diagnosis of advanced cancer until death or end of study (range: 0=never received palliative care to 1=received palliative care at time of diagnosis). For the dependent variable, we used a patient-level overall quality score calculated with the scores of 40 ASSIST process quality measures (theoretical range 0 to 1). To take into account that different patients are eligible for different quality indicators with varying pass rates, we used an observed minus expected score. Using this methodology, a patient's observed score is weighed against the expected score of a hypothetical patient who was eligible for the same quality indicator pattern and received average results and an observed-minus-expected score is calculated (theoretical range −1 to 1) (30).

We evaluated separate regressions to look at the influence of specialty palliative care consultation on the outcomes of quality score overall and by domain (information and care planning, pain and non-pain symptoms). We selected the patient factors included in our model (gender, race/ethnicity, age, marital status, urban/rural residence, whether the patient died during the study period), cancer type, comorbidity (ACE-27), clinical trial participation, copay exemption status, brain metastases, and homelessness) using a pre-specified conceptual model of factors thought to be likely to influence receipt of quality supportive care. We calculated the effect size with the Cohen's *d* statistic to understand the size of the impact of palliative care on process quality for domains of quality where there was a significant association detected. Cohen's *d* statistic is a measure of the difference between two means (for this study this represents the mean quality score for patients with palliative care at time of diagnosis compared to the mean quality score for those not receiving palliative care).

Sensitivity Analyses

As in any observational study, estimation of the impact of palliative care consultation on supportive care quality may be biased if confounding variables are not appropriately accounted for. In order to increase potential for a consistent effect estimator, as a sensitivity analysis we used a doubly robust propensity score, using the same independent variables for both our exposure and outcome models (18–21). Since doubly robust results were similar to those found using multivariable regression alone, we present results from standard OLS regression.

Since we planned our multivariable analyses based on a pre-specified conceptual model, we did not apply a Bonferroni correction for multiple comparisons prospectively, but did so as a sensitivity analysis.

Results

Cohort

Our cohort includes 719 Veterans with advanced cancer (colorectal 37%, lung 33%, pancreatic 30%) and the majority were male (97%), white (74%) and most lived in urban locations (67%). Half were married or living with a significant other at the time of diagnosis of advanced cancer. Over half had moderate or severe comorbidity scores and all but 54 of the patients died during the three-year follow-up. A minority of patients were homeless (3%) and most were co-pay exempt for medication (65%) (Table 1).

Frequency, Location and Timing of Palliative Care Consultation

Forty-one percent (293/719) of Veterans received a palliative care specialist consultation, the majority of which were in the inpatient setting with only 74/293 (25%) Veterans having an outpatient consult. Among those receiving a consult, on average the consult occurred more than halfway into the trajectory from diagnosis to death or end of study (range first day of diagnosis to day of death) (Table 2). To put this into context, among the 665 Veterans who died during the three-year follow-up, mean survival was 8.4 months (median survival 5.6 months, range 1 month-35.6 months). Among the 293 Veterans who had a palliative care consult, the mean timing of receipt of first palliative care consult was 3.5 months before death (median 1.5 months before death). Among Veterans who had a consultation, they most often received only one consult with a range of one to four consults (Table 3).

Specialty Palliative Care Consultation and Quality of Supportive Cancer Care

Controlling for other factors, patients who received a palliative care consult at time of diagnosis received quality scores seven percentage points (PP) higher for palliative care overall ($P < 0.001$) and 11 PP higher ($P<0.001$) within the information and care planning domain compared to patients who never received a consult, without statistically significant improvements in the pain and non-pain symptoms domains (Table 4). In both cases, these differences are of moderate size (Cohen's d 0.475 and 0.487, respectively), representing about half of one standard deviation of the O-E outcome (from Table 1).

Variation in Supportive Care Quality

Controlling for all other variables, Hispanic Veterans received quality scores nine PP lower within the information and care planning domain as compared to White Veterans ($P=0.036$) and 10 PP higher quality scores within the non-pain symptom domain ($P=0.042$). Urban veterans also received five PP higher quality scores compared with rural Veterans ($P=0.007$) in the information and care planning domain. Pancreatic cancer patients received five PP higher quality scores within the information and care planning domain compared with patients with colorectal cancer ($P=0.026$). Lung cancer patients received six PP higher quality scores in the non-pain symptom quality domain compared to colorectal cancer patients ($P=0.018$). Veterans without comorbidity also had five PP higher scores in overall supportive quality ($P=0.034$) and eight PP higher quality pain care ($P=0.037$) compared with patients with severe comorbidity ($P=0.037$). Patients who died during the study received seven PP higher quality within the information and care planning domain ($P=0.042$) compared to patients who were still alive at the end of the period of observation. Marital status and cancer type were associated with differences in overall quality of less than three PP overall.

Sensitivity Analyses: Results with Bonferroni Correction

We ran four separate multivariable regressions (one for each outcome variable studied), each with 13 independent variables resulting in 52 comparisons. We applied a Bonferroni correction and used a P-value of less than 0.001 to indicate statistical significance. Even with this threshold, our primary findings of association of palliative care specialty consultation with overall quality of supportive care and specifically within the information and care planning domain are robust with a P-value <0.0001.

Discussion

Patients with life-limiting illness often have unmet needs for symptom management and communication (29). Our recent study measuring quality of supportive care in a national sample of Veterans highlighted areas for improvement, and we hypothesized based on recent clinical trials (8,25,26), that earlier palliative care specialist consultation would be associated with improved quality of supportive care in patients with advanced cancer. We indeed found evidence for the effectiveness of palliative care consultation in improving the quality of supportive cancer care, and notably associated with significant improvements in the domain of information and care planning. Our findings are consistent with Temel's findings that palliative care teams focus on psychosocial care (i.e., coping) and foster “cultivation of prognostic awareness” that improves information and care planning (1,12–16,24).

The real-world example we studied offers important, actionable lessons for informing supportive care in health care settings other than the VA. Our results reflect a moderate effect size for palliative care at diagnosis of metastatic disease overall and in the information and care planning domain based on conventional interpretation of Cohen’s *d* statistic of 0.5 (difference in quality associated with palliative care consultation divided by the standard deviation for quality in the population) and support the effectiveness of early palliative consultation among a sample of patients with advanced, common cancers in a large integrated health system. This effect size for palliative care is similar to that seen in the Temel randomized controlled trial (8). Research with Assessing Care of Vulnerable Elders (ACOVE) process measures among vulnerable elders showed that a 10% improvement in process measures led to a measurable improvement in survival (31). Higher quality process of care has also been linked to improved health-related quality of life and functional status in other studies (32,33). Evidence suggests that ASSIST quality measures, particularly the information and care planning domain, are linked to improved quality of life and satisfaction (1,24), though potential improvements in survival are also possible (2). Future research should confirm that an improvement of 5–10 percentage points in supportive care processes as measured by ASSIST quality indicators leads to valued patient outcomes. It should be noted, on average Veterans in this sample received palliative care for only the last 40% of time between diagnosis and death, so did not accrue this level of benefit. Veterans who would receive this magnitude of improvement are those who would receive palliative care consultation at time of diagnosis rather than later in the disease trajectory.

One goal for the VA based on these results might be to move palliative care specialist services more upstream for Veterans with advanced cancer. Unfortunately, limited palliative care workforce and resources will likely constrain the goal of including a palliative care multidisciplinary team at time of diagnosis for all patients with advanced disease (11). Our evaluation, however, identifies palliative processes of care that palliative care teams improve, which could inform efforts to build capacity of primary care teams and inform new models of palliative care provision. Future research should evaluate new models of care that ensure that high quality supportive care is provided to patients with advanced cancer throughout the trajectory of their illness.

The receipt of lower-quality supportive care by Hispanic Veterans, specifically in the Information and Care Planning domain, requires further study but may prove to be an important quality improvement target. This is likely related to communication barriers (cultural and linguistic) where the family may have limited English proficiency. This finding is consistent with prior research showing that minorities are less likely to have advance directives, use hospice, and receive care that is consistent with their preferences (34,35). Interestingly this group received higher quality non-pain symptom care which also requires further study.

Rural Veterans received lower quality supportive care in the information and care planning domain, suggesting that geography may provide a physical barrier to resources that facilitate high quality information and care planning. Prior research indicates that rural Veterans and their caregivers have indicated that transportation issues pose a significant barrier to accessing care (36,37). Furthermore, the likelihood of receiving home health services and professional home care services such as palliative care has been found to be significantly lower for patients at the end of life in rural locations (38). Supportive care interventions that meet the unique needs of this population should be considered. Specialty Care Access Network Extension for Community Healthcare Outcomes (SCAN-ECHO) and tele-health programs are examples of VA's efforts to respond to the needs of this population.

Limitations to our analysis include that these are observational data and therefore we cannot assume a causal relationship for the association of palliative care and supportive care quality. It is possible that oncologists that refer to palliative care are also more likely to provide higher quality supportive care themselves. We did address the possibility for treatment selection by using doubly robust propensity scores although similar to traditional propensity score approaches, the possibility of confounding due to unobserved factors cannot be entirely ruled out. Furthermore, our process measures were developed using the rigorous RAND-UCLA method for quality indicator development (42), but the indicators developed for the pain and symptom management domains may not have been sensitive enough to capture changes introduced by a palliative care team. While it is possible that palliative care consultation did not have an impact on these processes of care, it is also possible that palliative care consultation led to improvements in these domains that our measures did not detect. Our study was also completed within an integrated health system that has invested for over a decade in improving palliative care services, so no doubt there are contextual factors fostering improvement that additional research should evaluate. Conversely, because we focused on a health system already known for excellent cancer care and efficiency (39–41), we may underestimate the benefits of palliative care in other contexts.

In summary, this real world example supports prior randomized control trial evidence and shows that earlier palliative care is associated with a higher process of care quality score in lung, colorectal, and pancreatic cancer, predominantly driven by improvements in the domain of information and care planning. This study supports the effectiveness of early palliative care consultation in three common advanced cancers and provides new information about what processes of care are most influenced with the involvement of palliative care teams. This work can inform ongoing efforts to improve the supportive experience of patients and families facing this disease.

Acknowledgments

This paper is based on work supported by the U.S. Department of Veterans Affairs, Veterans Health Administration, Office of Research and Development, Health Services Research & Development (HSR&D) Service (Project # IIR 09–097). The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs or the United States government. Since July 2013, Dr. Walling has also been supported by NIH/National Center for Advancing Translational Science (NCATS) UCLA CTSI Grant Number (UL1TR000124) and the NIH Loan Repayment Program. The funding source had no role in the design and conduct of the study; in the collection, analysis, and interpretation of the data; or in the preparation, review, or approval of the manuscript.

Special thanks to Arvid Sjolander, Associate Professor at the Department of Medical Epidemiology and Biostatistics at Karolinska Institute, Stockholm, Sweden for his advice regarding doubly robust propensity score methods. Drs Walling and Lorenz had full access to all data in the study and take responsibility for the integrity of

the data and the accuracy of the data analysis. Preliminary data were presented at the Society of General Internal Medicine Annual Meeting in poster format on April 22, 2014.

References

1. Wright AA, Zhang B, Ray A, et al. Association between end-of-life discussions, patient mental health, medical care near death, and caregiver bereavement adjustment. JAMA. 2008; 300:1665–1673. [PubMed: 18840840]
2. Zhang B, Wright AA, Huskamp H, et al. Health costs in the last week of life: associations with end-of-life conversations. Arch Intern Med. 2009; 169:480–488. [PubMed: 19273778]
3. Lautrette A, Darmon M, Megerbane B, et al. A communication strategy and brochure for relatives of patients dying in the ICU. N Eng J Med. 2007; 356:469.
4. Morrison S, Penrod J, Cassel B, et al. Cost savings associated with US hospital palliative care consultation programs. Arch Intern Med. 2008; 168:1783–1790. [PubMed: 18779466]
5. Higginson IJ, Finlay IG, Goodwin DM, et al. Is there evidence that palliative care teams alter end-of-life experiences of patients and their caregivers? J Pain Symptom Manage. 2003; 25:150–168. [PubMed: 12590031]
6. Casarett D, Pickard A, Bailey E, et al. Do palliative consultations improve patient outcomes? J Am Geriatr Soc. 2008; 56:593–599. [PubMed: 18205757]
7. Penrod J, Deb P, Dellenbaugh C, et al. Hospital-based palliative care consultation: effects of hospital cost. J Palliat Med. 2010; 13:973–979. [PubMed: 20642361]
8. Temel JS, Greer JA, Muzikansky A, et al. Early palliative care in patients with metastatic non-small cell lung cancer. N Engl J Med. 2010; 363:733–742. [PubMed: 20818875]
9. Morrison S, Penrod J, Cassel B, et al. Cost savings associated with US hospital palliative care consultation programs. Arch Intern Med. 2008; 168:1783–1790. SAME AS REF 4. [PubMed: 18779466]
10. Lorenz KA, Lynn J, Dy SM, et al. Evidence for improving palliative care at the end of life: a systematic review. Ann Intern Med. 2008; 148:147–159. [PubMed: 18195339]
11. Smith TJ, Temin S, Alesi ER, et al. American Society of Clinical Oncology provisional clinical opinion: the integration of palliative care into standard oncology care. J Clin Oncol. 2012; 30:880–887. [PubMed: 22312101]
12. Jackson VA, Jacobsen J, Greer JA, et al. The cultivation of prognostic awareness through the provision of early palliative care in the ambulatory setting: a communication guide. J Palliat Med. 2013; 16:894–900. [PubMed: 23786425]
13. Jacobson J, Jackson V, Dahlin C, et al. Components of early outpatient consultation in patients with metastatic nonsmall cell lung cancer. J Palliat Care. 2011; 14:459–464.
14. Young J, Park E, Greer JA, et al. Early palliative care in advanced lung cancer: a qualitative study. JAMA Intern Med. 2013; 173:283–290. [PubMed: 23358690]
15. Temel JS, Greer JA, Adame S, et al. Longitudinal perceptions of prognosis and goals of therapy in patients with metastatic non-small-cell lung cancer: results of a randomized study of early palliative care. J Clin Oncol. 2011; 29:2319–2316. [PubMed: 21555700]
16. Greer JA, Pril WF, Jackson VA, et al. Effect of early palliative care on chemotherapy use and end-of life care in patients with metastatic non-small cell lung cancer: results of early palliative care. J Clin Oncol. 2011; 29:2319–2326. [PubMed: 21555700]
17. Walling AM, Tisnado D, Asch SM, et al. The quality of supportive cancer care in the veterans affairs health system and targets for improvement. JAMA Intern Med. 2013; 173:2071–2079. [PubMed: 24126685]
18. Brookhart MA, Schneeweiss S, Rothman KM, et al. Variable selection for propensity score models. Am J Epidemiol. 2006; 163:1149–1156. [PubMed: 16624967]
19. Heckman J. Instrumental variables: a study of implicit behavioral assumptions used in making program evaluations. J Human Res. 1997; 32:441–462.
20. Ichimura H, Taber C. Propensity-score matching with instrumental variables. Am Economic Rev. 2001; 91:119–124.

21. Weitzen S, Lapane KL, Toledano AY, Hume AL, Mor V. Principles for modeling propensity scores in medical research: a systematic literature review. Pharmacoepidemiol Drug Saf. 2004; 13:841–853. [PubMed: 15386709]
22. Higashi T, Shekelle PG, Adams JL, et al. Quality of care is associated with survival in vulnerable older patients. Ann Intern Med. 2005; 143:274–281. [PubMed: 16103471]
23. Walling AM, Asch SM, Lorenz KA, et al. Impact of consideration of transplantation on end-of-life care for patients during a terminal hospitalization. Transplantation. 2013; 95:641–646. [PubMed: 23197177]
24. Mack JW, Weeks JC, Wright AA, et al. End-of-life discussions, goal attainment, and distress at the end of life: predictors and outcomes of receipt of care consistent with preferences. J Clin Oncol. 2010; 28:1203–1208. [PubMed: 20124172]
25. Zimmermann C, Swami N, Krzyzanowska M, et al. Early palliative care for patients with advanced cancer: a cluster-randomized controlled trial. Lancet. 2014; 383:1721–1730. [PubMed: 24559581]
26. Bakitas M, Lyons, Hegel MT, et al. Effects of palliative care intervention on clinical outcomes in patients with advanced cancer: the project ENABLE II randomized controlled trial. JAMA. 2009; 302:741–749. [PubMed: 19690306]
27. Dy SM, Lorenz KA, O’Neill SM, et al. Cancer Quality-ASSIST supportive oncology quality indicator set: feasibility, reliability, and validity testing. Cancer. 2010; 116:3267–3275. [PubMed: 20564637]
28. Malin JL, O’Neill SM, Asch SM, et al. Quality of supportive care for patients with advanced cancer in a va medical center. J Palliat Med. 2011; 14:573–577. [PubMed: 21413885]
29. Teno JM, Clarridge BR, Casey V, et al. Family perspectives on end-of-life care at the last place of care. JAMA. 2004; 291:99–103. [PubMed: 14709582]
30. Min LC, Reuben DB, MacLean CH, et al. Predictors of overall quality of care provided to vulnerable older people. J Am Geriatr Soc. 2005; 53:1705. [PubMed: 16181169]
31. Higashi T, Shekelle PG, Adams JL, et al. Quality of care is associated with survival in vulnerable older patients. Ann Intern Med. 2005; 143:274–281. [PubMed: 16103471]
32. Zigmond DS, Ettner SL, Wilber KH, Wenger NS. Association of claims-based quality of care measures with outcomes among community-dwelling elders. Med Care. 2011; 49:553–559. [PubMed: 21499140]
33. Kahn KL, Tisnado DM, Adams JL, et al. Does ambulatory process of care predict health-related quality of life outcomes for patients with chronic disease? Health Serv Res. 2007; 42:63–83. [PubMed: 17355582]
34. Loggers ET, Maciejewski PK, Paulk E, et al. Racial differences in predictors of intensive end-of-life care in patients with advanced cancer. J Clin Oncol. 2009; 27:5559–5564.
35. Johnson KS. Racial and ethnic disparities in palliative care. J Palliat Med. 2013; 16:1–6.
36. Reed DM, Weicherding M. Factors of caregiver isolation in a rural Midwest area. Home Health Care Serv Q. 1999; 17:13–24. [PubMed: 10539578]
37. Buzza C, Ono SS, Turvey C, et al. Distance is relative: unpacking a principal barrier in rural healthcare. J Gen Intern Med. 2011; (Suppl 2):648–654. [PubMed: 21989617]
38. Goodridge D, Lawsom J, Rennie D, et al. Rural/urban differences in health care utilitzation and place of death for persons with respiratory illness in the last year of life. Rural Remote Health. 2010; 10:1349. [PubMed: 20438281]
39. Keating NL, Landrum MB, Lamont EB, et al. Quality of care for older patients with cancer in the Veterans Health Administration versus the private sector: a cohort study. Ann Intern Med. 2011; 154:727–736. [PubMed: 21646556]
40. Landrum MB, Keating NL, Lamont EB, et al. Survival of older patients with cancer in the Veterans Health Administration versus fee-for-service Medicare. J Clin Oncol. 2012; 30:1072–1079. [PubMed: 22393093]
41. Keating NL, Landrum MB, Lamont EB, et al. End-of-life care for older cancer patients in the Veterans Health Administration versus the private sector. Cancer. 2010; 116:3732–3739. [PubMed: 20564065]

42. Lorenz KA, Dy SM, Naeim A, et al. Quality measures for supportive cancer care: the cancer quality-ASSIST project. J Pain Symptom Manage. 2009; 37:943–964. [PubMed: 19359135]

Table 1

Description of the ASSIST Cohort by Receipt of Palliative Care Consult (N = 719)

Patient Characteristics	Cohort Characteristics (N = 719)		Received Palliative Care Consult (N = 293)		No Palliative Care Consult (N = 426)	
	N	% or Mean (SD)	N	% or Mean (SD)	N	% or Mean (SD)
Age at diagnosis **	719	66.16 (10.29)	293	64.91 (10.41)	426	67.02 (10.13)
Gender						
Male	699	97.22	282	96.25	417	97.89
Female	20	2.78	11	3.75	9	2.11
Race/Ethnicity						
White (Non-Hispanic)	534	74.27	203	69.28	331	77.70
Black (Non-Hispanic)	143	19.89	69	23.55	74	17.37
Asian-Pacific Islander (Non-Hispanic)	12	1.67	7	2.39	5	1.17
Hispanic	30	4.17	14	4.78	16	3.76
Residence location status **						
Urban	480	66.76	216	73.72	264	61.97
Rural/Highly Rural	239	33.24	77	26.28	162	38.03
Marital status **						
Married/Lives with significant other	365	50.76	134	45.73	231	54.23
Single/Separated/Divorced/Widowed (No Data)	354	49.24	159	54.27	195	45.77
Primary Cancer						
Colorectal	266	37.00	101	34.47	165	38.73
Lung	239	33.24	100	34.13	139	32.63
Pancreatic	214	29.76	92	31.40	122	28.64
Brain Metastasis at Diagnosis						
Yes	90	12.52	38	12.97	52	12.21
No or No Data	629	87.48	255	87.03	374	87.79
Adult Co-morbidity Evaluation Score (ACE-27)						

Patient Characteristics	**Cohort Characteristics (N = 719)**		**Received Palliative Care Consult (N = 293)**		**No Palliative Care Consult (N = 426)**	
	N	**% or Mean (SD)**	**N**	**% or Mean (SD)**	**N**	**% or Mean (SD)**
None	52	7.23	18	6.14	34	7.98
Mild	284	39.50	113	38.57	171	40.14
Moderate	170	23.64	82	27.99	88	20.66
Severe	213	29.62	80	27.30	133	31.22
Co-pay exempt for medication						
Yes	468	65.09	201	68.60	267	62.68
No or No Data	251	34.91	92	31.40	159	37.32
Clinical Trial Participation						
Yes	46	6.40	18	6.14	28	6.57
No or No Data	673	93.60	275	93.86	398	93.43
Died during 3 year follow up**						
Yes	665	92.49	285	97.27	380	89.20
No	54	7.51	8	2.73	46	10.80
Homeless**						
Yes	23	3.20	15	5.12	8	1.88
No or No Data	696	96.80	278	94.88	418	98.12
Timing of first palliative care consult	717	0.155 (0.284)	291	0.382 (0.336)	426	N/A
Quality of care domain scores (O – E)						
Overall quality**	719	−0.004 (0.139)	293	0.021 (0.134)	426	−0.020 (0.140)
Pain quality	715	−0.006 (0.235)	292	0.008 (0.211)	423	−0.015 (0.250)
Information and care planning quality**	719	−0.006 (0.235)	293	0.030 (0.225)	426	−0.030 (0.238)
Non-pain symptoms quality**	712	−0.010 (0.248)	290	0.013 (0.244)	422	−0.026 (0.250)
Quality of care domain scores (Observed)***						
Overall quality**	719	0.480 (0.172)	293	0.537 (0.162)	426	0.441 (0.168)

Patient Characteristics	Cohort Characteristics (N = 719)		Received Palliative Care Consult (N = 293)		No Palliative Care Consult (N = 426)	
	N	% or Mean (SD)	N	% or Mean (SD)	N	% or Mean (SD)
Pain quality**	715	0.685 (0.255)	292	0.731 (0.226)	423	0.654 (0.269)
Information and care planning quality**	719	0.416 (0.278)	293	0.490 (0.247)	426	0.366 (0.287)
Non-pain symptoms quality**	712	0.368 (0.274)	290	0.422 (0.276)	422	0.330 (0.266)

[*] Four Veterans drop out of the pain quality domain analysis because they do not trigger any of the quality indicators in this domain. Seven Veterans drop out of the non-pain symptom domain analysis because they do not trigger any of the quality indicators in this domain. For two Veterans with palliative care consultation, timing of the consult was not documented.

[**] If p-value is ≤ 0.05 for bivariate comparisons.

[***] Because the key predictor is based on receipt of a specialist consultation, we modified one of the 8 total QIs in that domain: (QI #83) *IF* an outpatient dies an expected death… *THEN* he/she should have been referred to palliative care within 6 months prior to death (hospital-based or community hospice) or there should be documentation why there was no referral. The alternative version of this QI removes palliative care and focuses solely on hospice, and we included this modified version in the calculation of the Overall Quality and Information and Care Planning scores.

Table 2

Palliative Care Consult Timing Among Patients Who Received a Palliative Care Consult

<table>
<tr><th colspan="6">Timing of First Palliative Care Consult Among Patients Who Received A Palliative Care Consult (N=293)
(# Days Prior to Death or End of Study of Palliative Care Consult/# Days from Diagnosis of Stage IV Disease until Death or End of Study)</th></tr>
<tr><th>Cancer Type</th><th>N</th><th>Mean</th><th>Minimum</th><th>Maximum</th><th>Standard Deviation</th></tr>
<tr><td>Colorectal</td><td>101</td><td>0.33</td><td>0</td><td>1.00</td><td>0.35</td></tr>
<tr><td>Lung</td><td>100</td><td>0.37</td><td>0</td><td>1.00</td><td>0.32</td></tr>
<tr><td>Pancreatic</td><td>92</td><td>0.45</td><td>0</td><td>0.99</td><td>0.33</td></tr>
</table>

Table 3

Palliative Care Consult Frequency Among Patients Who Received a Palliative Care Consult

Frequency of Palliative Care Consults Among Patients Who Received A Palliative Care Consult (N=293)					
Cancer Type	**N**	**Mean**	**Minimum**	**Maximum**	**Standard Deviation**
Colorectal	101	1.29	1	4	0.62
Lung	100	1.19	1	4	0.49
Pancreatic	92	1.22	1	3	0.46

Table 4

Multiple regression studying patient-level associations with overall quality of supportive cancer care quality and by domain

Patient Characteristics	Overall Quality		Pain Quality		Information and Care Planning Quality		Non-Pain Symptoms Quality	
	Coef.	P	Coef.	P	Coef.	P	Coef.	P
Timing of first palliative care consult	.066***	0.000	.043	0.179	.114****	0.000	.053	0.118
Age at diagnosis								
< 60 years	−.007	0.593	.018	0.418	.005	0.819	−.040	0.086
60–75 years [†]								
> 75 years	.002	0.866	−.017	0.449	−.000	0.994	.027	0.271
Gender								
Male	.002	0.943	.058	0.282	.001	0.992	−.028	0.629
Female [†]								
Race/Ethnicity								
White (Non-Hispanic) [†]								
Black (Non-Hispanic)	−.004	0.736	−.003	0.912	−.028	0.211	.006	0.788
Asian-Pacific Islander (Non-Hispanic)	−.055	0.172	.024	0.730	−.128	0.060	−.018	0.805
Hispanic	.005	0.847	.045	0.326	−.093	0.036	.097	0.042
Residence location status								
Urban	.012	0.311	−.023	0.230	.052	0.007	−.009	0.659
Rural/Highly Rural [†]								
Marital status								
Married/Lives with significant other	−.022	0.040	−.031	0.084	.003	0.854	−.037	0.053
Single/Separated/Divorced/Widowed (No Data) [†]								
Primary Cancer								
Colorectal [†]								
Lung	.030	0.028	.004	0.871	.000	0.986	.059	0.018

Patient Characteristics	Overall Quality		Pain Quality		Information and Care Planning Quality		Non-Pain Symptoms Quality	
	Coef.	P	Coef.	P	Coef.	P	Coef.	P
Pancreatic	.027	0.039	.016	0.476	.050	0.026	.021	0.373
Brain Metastasis at Diagnosis								
Yes	−.014	0.414	−.015	0.615	.014	0.625	−.021	0.513
No or No Data †								
Adult Co-morbidity Evaluation Score (ACE-27)								
None	.047	0.034	.079	0.037	.015	0.695	.053	0.184
Mild	.004	0.775	.032	0.138	.007	0.732	−.011	0.624
Moderate	.018	0.224	.048	0.050	−.006	0.790	.026	0.321
Severe †								
Co-pay exempt for medication								
Yes	.002	0.840	.035	0.063	−.008	0.650	−.001	0.964
No or No Data †								
Clinical Trial Participation								
Yes	−.021	0.332	−.018	0.624	−.009	0.801	−.031	0.423
No or No Data †								
Died during 3 year follow up								
Yes	.027	0.185	−.031	0.392	.070	0.042	.033	0.376
No †								
Homeless								
Yes	−.016	0.608	−.015	0.771	−.020	0.690	.019	0.729
No or No Data †								

[**] If p-value is ≤ 0.05 for bivariate comparisons.

[†] Denotes reference group.

[***] Cohen’s *d* statistic for palliative care association with overall quality is 0.066/0.139=0.475

[****] Cohen’s *d* statistic for palliative care association with quality in the information and care planning domain is 0.114/0.235=0.487