Published in final edited form as:

Palliat Med. 2019 April ; 33(4): 452–456. doi:10.1177/0269216318824270.

Hospital palliative care consult improves value-based purchasing outcomes in a propensity score–matched cohort

Justin M Glasgow[1,2], **Zugui Zhang**[2], **Linsey D O'Donnell**[1], **Roshni T Guerry**[1], **Vinay Maheshwari**[1]

[1]Department of Internal Medicine, Christiana Care Health System, Newark, DE, USA

[2]Value Institute, Christiana Care Health System, Newark, DE, USA

Abstract

Background: Hospital-based palliative care consultation is consistently associated with reduced hospitalization costs and more importantly with improved patient quality of life. As healthcare systems move toward value-based purchasing rather than fee-for-service models, understanding how palliative care consultation is associated with value-based purchasing metrics can provide evidence for expanded health system support for a greater palliative care presence.

Aim: To understand how a palliative care consultation impacts rates of patient readmission and hospital-acquired infections associated with value-based purchasing metrics.

Design: Retrospective propensity-matched case–control study evaluating the impact of palliative care consultation on hospital charges, hospital and intensive care unit length of stay, readmission rates, and rates of hospital-acquired conditions.

Setting/participants: All adult patients admitted to a two hospital healthcare system over a 2-year period from 1 April 2015 to 31 March 2017. The palliative care team involved three physicians, five advanced practice providers, a social worker, and a chaplain during the study period.

Results: A total of 3415 patients receiving a palliative consult were propensity matched to 25,028 controls. Compared to controls, cases had decreased charges per day and decreased rates of 7-, 30-, and 90-day readmissions.

Conclusion: Through value-based purchasing, hospitals have 3% of their Medicare reimbursements at risk based on readmission rates. By clarifying prognosis and patient goals, palliative care consultation reduces readmission rates. Hospital systems may want to invest in larger palliative care programs as part of their efforts to reduce hospital readmissions.

Keywords

Palliative care; value-based purchasing; hospital charges; patient readmission; case–control studies; referral and consultation

Corresponding author: Justin M Glasgow, Department of Internal Medicine, Christiana Care Health System, 4755 Ogletown-Stanton Road, Ammon Suite 2E70, Newark, DE 19718, USA. justin.m.glasgow@gmail.com.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Background

Palliative care programs continue to expand providing greater numbers of patients with improved quality of life. As of 2012, greater than 60% of hospitals with at least 50 beds reported having a palliative care team.[1] In the United States, palliative care expansion is driven by a recognition that 25% of healthcare expenditures occur in the last year of life and do not have associated improvements in patient quality of life.[2] By shifting focus toward patient goals and preferences, palliative care consultation improves symptom control and quality of life, and reduces costs.[3]

In both developed and developing countries, there is a struggle to fund palliative care as it can be difficult to fully measure the true avoided costs associated with a palliative care consult.[4-6] There further is limited economic evidence or research in palliative care to help programs understand how to get their systems to provide supportive funding.[7] Given varying funding structures, individual programs will have to think creatively about how they can document value for their program. As our own institution desired to understand the current success of the palliative program and understand whether it was fiscally appropriate to expand the service, we took advantage of the ongoing transition within the US healthcare system to shift payment to models that pay for increased quality and value rather than simply paying for providing discrete services. The following analysis examined traditional metrics utilized in evaluating palliative care such as length of stay (LOS) and hospitalization charges, but also evaluates the relationship between palliative care and value-based metrics such as readmission rates and rates of hospital-acquired conditions.

Methods

Study setting

This case–control evaluation considers the impact of palliative care consultation during an inpatient hospitalization from 1 April 2015 to 31 March 2017. Patients were discharged from either of two hospitals in an integrated healthcare system with approximately 1500 inpatient beds and 55,000 annual admissions. The palliative care team started in 2004 offering acute pain and palliative services staffed with 0.25 FTE MD and 1.0 FTE NP. By 2015, the service was providing palliative consults alone and had grown to three physicians, five advanced practice providers, one social worker, and one chaplain. As an internal program review for performance improvement, the study was exempt from institutional review board (IRB) review.

Population

The studied patient population represents all patients 18 years or older discharged during the study period from 1 April 2015 to 31 March 2017. Cases include any hospitalization with a palliative care consultation completed, as identified based on provider medical billing. All other patients discharged during the study period are potential controls. Given the selection bias associated with requesting a palliative consult, we used propensity score matching to identify a representative control cohort.

Outcomes

We examined total hospitalization charge, hospital LOS, intensive care unit (ICU) LOS, and charges per day. In addition, we considered value-based outcomes of 7-, 30-, and 90-day hospital readmissions, measured as any hospital inpatient readmission to our health system. We examined the rates of dialysis initiation during hospitalization, although this measure cannot distinguish between those who had chronic dialysis prior to admission with those that were newly initiated on dialysis during the index hospitalization. For hospital-acquired conditions affected by value-based payments, we considered *Clostridium difficile* (C-diff), post-operative infection, catheter-associated urinary tract infection (CAUTI), and methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia. These values were extracted from system data used for reporting to University HealthSystem Consortium (UHC). Central line blood stream infections are also a component of the Medicare hospital-acquired condition program; however, during data verification, an error was identified in how these data were extracted to the data warehouse and it had to be excluded from the analysis. Finally, we report total ventilator hours during hospitalization.

Statistical analysis

For baseline population characteristics and outcomes, continuous and categorical variables were reported as mean ± standard deviation (SD) or percentages and analyzed by Pearson chi-square test for categorical variables and Wilcoxon rank-sum test for continuous variables. To address the significant differences with respect to baseline characteristics among patients with or without palliative care consults, propensity scores, reflecting the probability that a patient would receive consultation, were developed with the use of logistic regression to adjust for between-group differences in baseline characteristics of the patients, based on age, sex, marital status, insurance, primary discharge diagnosis, and number of Elixhauser comorbidities. Cases were matched to controls based on a previously published propensity matching algorithm where cases are matched to controls in a one-to-many ratio as long as the logit of the control patient's propensity score was within 0.05 SD of the logit of the palliative care patient's score.[8] As a prior analysis has shown a greater impact on hospital costs, the earlier a patient is seen by palliative, we planned a subgroup analysis for those patients seen by palliative within the first 72 h of their hospitalization.[8]

Results

From 1 April 2015 to 31 March 2017, a total of 102,646 eligible discharges were identified. There were 3415 (3.3%) palliative care consults. Table 1 displays the baseline patient demographics with the first two columns showing the unmatched baseline population, with the last two columns showing the population after the one-to-many matching was completed. The propensity matching performed well generating a cohort that was statistically similar to the palliative cohort on general demographics, but the palliative patients still exhibited higher rates of patients with the most severe illnesses or the highest risk of mortality compared to their matched controls.

Table 2 shows the results of comparing the traditional financial metrics between the palliative and propensity-matched control. In our population, the palliative care group

maintains higher total hospitalization charges, likely driven by the longer time spent in the ICU and a greater overall hospital LOS. However, when evaluating the charges/day, the palliative care group has an average daily charge that is $2353 less than the control group ($p < 0.001$).

The value-based outcome results are displayed in Table 3. Patients receiving palliative care consultation exhibited statistically reduced 7-, 30-, and 90-day readmission rates ($p < 0.001$ for all comparisons). In contrast, there were higher rates of dialysis, C-diff infection, MRSA bacteremia, and total ventilator hours.

The subgroup of patients seen within the first 72 h of admission (Table 4) represented approximately 50% of palliative consults. Compared to their matched cohort, they continued to have a longer hospital and ICU LOS, but the difference was not as substantial compared to the full matched cohort analysis. There persists a reduction in charges per day of $2441. On the value-based outcomes, there is no longer a difference in readmission rates, while higher rates of dialysis, C-diff, MRSA, and ventilator hours persist.

Discussion

This analysis of our inpatient palliative care program reveals that even as there is an improving awareness about end-of-life planning among the public and increased training in this area among physicians, an expert palliative hospital consultation continues to be associated with reduced hospitalization charges. Our local data show an approximately $2350 daily savings in charges for patients seen by palliative care. These reductions are in line but lower than other studies, some of which have shown cost reductions ranging from $4 to $7000 in Medicaid patients,[9] or a 22% cost reduction for cancer patients seen in consultation within 2 days that increased to a 32% reduction in costs in those patients with the highest comorbidity burden.[10]

Critically, our analysis found that a palliative consult was associated with improvements in value-based reimbursement outcomes. While hospital-acquired infection rates were similar or increased in comparison to the matched controls, our data cannot identify when these infections occurred in relation to the palliative consultation. It is quite probable that the occurrence of a hospital-acquired infection leads to a change in clinical status triggering a palliative consultation rather than the palliative consultation being associated with increased infection rates. In contrast, the palliative team exhibited clear success in the reduction of hospital readmissions. This may in part be driven by the fact that 50.7% of palliative cases had discharge dispositions of deceased or to hospice which eliminates or potentially reduces the likelihood of readmission.[11] However, we believe that these dispositions should not be discounted as it is often the palliative consult that helps solidify an understanding of the patient's goals and the decision to discontinue treatments prolonging life but not providing quality of life.

A limitation of this study is that it is observational and non-randomized which will limit how well our findings generalize to other institutions. The study incorporates propensity score matching to reduce bias; however, propensity score matching can only balance across

measured confounders, and it does not address bias associated with unmeasured confounders.

This single-institution study tells a powerful story of how careful consideration of relevant funding streams can lead to analyses that highlight the benefits of palliative care. For a US healthcare system with up to 3% of hospital Medicare reimbursements at risk, if patients have excess rates of hospital readmission, improving readmission rates is an opportunity to show that a robust palliative care service contributes to health system financial stability. The key metrics will vary across international payment systems, but this study provides a roadmap for analyzing metrics once those key metrics are identified. Then based on individual institutional findings, programs may identify opportunities to trigger or target palliative consults to maximize system benefit. Palliative care remains an essential tool for hospital systems looking for a proven patient-centered, value-based approach to care.

Acknowledgements

All the authors contributed to the design of the analysis, drafting or revision of the manuscript, approved the submission, participated sufficiently, and can take public responsibility for appropriate portions of the content.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Z.Z. was partially supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health (U54-GM104941).

References

1. Meier DE and Sieger CE. The case for hospital palliative care. Improving quality. Reducing cost. New York: Center to Advance Palliative Care, 2014, https://media.capc.org/filer_public/06/90/069053fe-12bf-4485-b973-d290f7c2ecbf/thecaseforhospitalpalliativecare_capc.pdf
2. Smith S, Brick A, O'Hara S, et al. Evidence on the cost and cost-effectiveness of palliative care: a literature review. Palliat Med 2014; 28(2): 130–150. [PubMed: 23838378]
3. Rowland K and Schumann S-A. Palliative care: earlier is better. J Fam Pract 2010; 59(12): 695–698, http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3183935&tool=pmcentrez&rendertype=abstract [PubMed: 21135924]
4. Callaway M, Foley KM, De Lima L, et al. Funding for palliative care programs in developing countries. J Pain Symptom Manage 2007; 33: 509–513. [PubMed: 17482039]
5. Cassel JB, Kerr KM, Kalman NS, et al. The business case for palliative care: translating research into program development in the U.S. J Pain Symptom Manage 2015; 50(6): 741–749. [PubMed: 26297853]
6. Groeneveld EI, Cassel JB, Bausewein C, et al. Funding models in palliative care: lessons from international experience. Palliat Med 2017; 31: 296–305. [PubMed: 28156188]
7. Gardiner C, Ingleton C, Ryan T, et al. What cost components are relevant for economic evaluations of palliative care, and what approaches are used to measure these costs? A systematic review. Palliat Med 2017; 31(4): 323–337. [PubMed: 27670418]
8. Morrison RS, Penrod JD, Cassel JB, et al. Cost savings associated with US hospital palliative care consultation programs. Arch Intern Med 2008; 168(16): 1783–1790. [PubMed: 18779466]
9. Morrison RS, Dietrich J, Ladwig S, et al. Palliative care consultation teams cut hospital costs for Medicaid beneficiaries. Health Aff 2011; 30(3): 454–463.
10. May P, Garrido MM, Cassel JB, et al. Palliative care teams' cost-saving effect is larger for cancer patients with higher numbers of comorbidities. Health Aff 2016; 35: 44–53.

11. Lah S, Wilson EL, Beesley S, et al. Association of hospice utilization and publicly reported outcomes following hospitalization for pneumonia or heart failure: a retrospective cohort study. BMC Health Serv Res 2018; 18(1): 12. [PubMed: 29316924]

What is already known about the topic?

- Hospital-based palliative care consultation is associated with reductions in patient length of stay and hospitalization costs.
- However, there have been no studies examining how palliative care consultation is associated with components of hospital value-based purchasing such as hospital readmission rates or hospital-acquired infections.

What this paper adds?

- This article reports a propensity-matched case–control study which shows that, in addition to reducing daily hospital charges, palliative care consultation is associated with a reduction in hospital 7-, 30-, and 90-day readmissions.

Implication for practice, theory, or policy

- Palliative care teams may want to target patients with readmissions as a patient population likely to benefit from their care.
- Healthcare systems should consider how palliative care can improve their value-based purchasing metrics and invest in palliative care teams appropriately.

Table 1.

Baseline population characteristics.

	Unmatched population*		Matched population	
	Palliative consult (*n* = 3415)	**No palliative consult (*n* = 99,231)**	**Palliative consult (*n* = 3187)**	**One-to-many matched controls (*n* = 25,028)**
Age (mean + SD)	72.4 (14.99)	58.1 (19.96)	72.09 (15.06)	70.13 (15.52) **
%Male	48.05	40.65	48.20	47.77 **
%White	68.87	69.87	68.62	70.78 **
%Married	38.04	45.91	38.50	38.56 **
%Medicare	78.65	49.59	78.38	75.32 **
%Commercial insurance	10.31	28.61	10.39	11.71 **
%Severity of illness = 4[a]	46.91	6.77	46.06	22.53 *
%Risk of mortality = 4[a]	42.31	6.04	41.20	20.36 *
#Comorbidities (SD)	9.96 (4.02)	5.81 (4.40)	10.12 (4.03)	9.20 (4.22)

SD: standard deviation.

[a]Severity of illness and risk of mortality scores based on all patient-refined diagnosis-related group risk, with four representing the most severe illnesses or the highest risk of mortality.

*Significant at $p < 0.001$.

**Non-significant at $p > 0.25$.

Table 2.

Financial outcomes.

	Palliative consult (*n* = 3187)	**One-to-many matched controls (*n* = 25,028)**
Total charges (SD)	$63,005 (59,489)	$41,087 (43,549)
Total ICU hours (SD)	138.0 (119.2)	88.3 (85.1)
Length of stay (SD)	10.09 (6.50)	6.45 (5.23)
Charges/day	$6846 (7102)	$9199 (42,122)

SD: standard deviation; ICU: intensive care unit.

*All comparisons significant at $p < 0.001$.

Palliat Med. Author manuscript; available in PMC 2021 March 30.

Table 3.

Value-based outcomes.

	***p*-value (favors palliative)**	**Palliative consult (*n* = 3187)**	**One-to-many matched controls (*n* = 25,028)**	***p*-value (favors controls)**
7-day readmit (%)	<0.001	184 (5.8)	1866 (7.5)	
30-day readmit (%)	<0.001	500 (15.7)	5083 (20.3)	
90-day readmit (%)	<0.001	827 (26.0)	8543 (34.1)	
Dialysis (%)		270 (8.5)	1802 (7.2)	0.01
C-diff (%)		43 (1.4)	163 (0.6)	<0.001
Post-op infection		2 (0.1)	47 (0.2)	
CAUTI		2 (0.1)	24 (0.1)	
MRSA		107 (3.4)	433 (1.7)	<0.001
Ventilator hours (SD)		108 (117)	55 (264)	<0.001

C-diff: *Clostridium difficile*; CAUTI: catheter-associated urinary tract infection; MRSA: methicillin-resistant *Staphylococcus aureus*; SD: standard deviation.

Table 4.

Subgroup analysis for patients evaluated by palliative within 72 h of admission.

	Palliative consult (*n* = 1648)	One-to-many matched controls (*n* = 9184)	*p*-value
Total charges (SD)	$45,418 (46,721)	$45,380 (46,747)	0.98
Total ICU hours (SD)	103.9 (91.23)	95.2 (89.1)	0.01
Length of stay (SD)	7.14 (5.01)	6.87 (5.59)	0.01
Charges/day	$7383 (8803)	$9824 (30,587)	0.04
7-day readmit (%)	90 (5.46)	549 (5.98)	0.41
30-day readmit (%)	262 (15.90)	1472 (16.03)	0.89
90-day readmit (%)	453 (27.49)	2518 (27.42)	0.95
Dialysis (%)	121 (7.34)	593 (6.46)	0.18
C-diff (%)	21 (1.27)	69 (0.75)	0.04
Post-op infection	0 (0)	22 (0.24)	0.04
CAUTI	0 (0)	8 (0.09)	0.61
MRSA	54 (3.28)	171 (1.86)	0.0002
Ventilator hours (SD)	85.51 (105.3)	61.56 (127.2)	0.01

C-diff: *Clostridium difficile*; ICU: intensive care unit; CAUTI: catheter-associated urinary tract infection; MRSA: methicillin-resistant *Staphylococcus aureus*; SD: standard deviation.