

Can Palliative Home Care Reduce 30-Day Readmissions? Results of a Propensity Score Matched Cohort Study

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Abstract

Objective: This study examined the impact of palliative home nursing care on rates of hospital 30-day readmissions.

Methods: The electronic health record based retrospective cohort study was performed within home care and palliative home care programs. Participants were home care patients discharged from one of three urban teaching hospitals. Outcome measures were propensity score matched rates of hospital readmissions within 30 days of hospital discharge.

Results: Of 406 palliative home care patients, matches were identified for 392 (96%). Of 15,709 home care patients, 890 were used at least once as a match for palliative care patients, for a total final sample of 1282. Using the matched sample we calculated the average treatment effect for treated patients. In this sample, palliative care patients had a 30-day readmission probability of 9.1% compared to a probability of 17.4% in the home care group (mean ATT: 8.3%; 95% confidence interval [CI] 8.0%–8.6%). This effect persisted after adjustment for visit frequency.

Conclusions: Palliative home care may offer benefits to health systems by allowing patients to remain at home and thereby avoiding 30-day rehospitalizations.

Introduction

AS HEALTH CARE COSTS CONTINUE TO RISE, many payers, health care systems, and providers are exploring opportunities for cost containment among those patients with serious life-threatening illness who incur the highest per capita health care costs.¹ In one study, 27% of the Medicare population accounted for 75% of spending.² A large proportion of these costs are hospital based,² and the estimated cost to Medicare in 2004 for unplanned hospital readmissions was \$17.4 billion.³ Of these unplanned readmissions, as many as 20% may occur within 30 days of discharge.³

Along with the added incentive of Medicare reimbursement rates, these data have driven efforts to reduce 30-day readmissions.^{4–6} This interest has produced a variety of interventions that have demonstrated reductions in hospital readmission rates.^{7–9} Overall, these interventions have shown some success, but it is clear that additional approaches are needed.^{4,10}

One such approach is home-based palliative care, an interdisciplinary set of services aimed at improving quality of

life, physical comfort, emotional and spiritual support, and advance care planning.^{11–13} A recent study has found patients seen by an inpatient consult service and subsequently followed by a palliative home care program or hospice may have lower rates of 30-day readmissions.¹⁴ However it is not known whether palliative home care can reduce 30-day readmissions compared to routine home care.

This question is important because palliative care services are becoming increasingly common in the U.S. health care system.¹⁵ If they can reduce 30-day readmissions, they may have an important role to play in post-acute care and particularly in accountable care organizations (ACOs).¹⁶ Therefore, the goal of this study was to evaluate the impact of a palliative care home program on 30-day readmission rates among seriously ill patients.

Methods

Setting and sample

This study was conducted in the University of Pennsylvania Health System post-acute care program (Penn Homecare

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TABLE 1. COMPARISON OF BASELINE CHARACTERISTICS OF TWO POPULATIONS

	Home care (n = 15,709)	Palliative home care (n = 407)	Odds ratio (95% CI); p-value
Electronic health record data			
Age: mean	61	67	1.02 (1.00–1.03); <i>p</i> < 0.001
Gender (female)	8606 (54.8%)	209 (51.4%)	0.87 (0.72–1.06); <i>p</i> = 0.170
Diagnosis (cancer)	788 (5.0%)	274 (67.3%)	39.00 (31.33–48.57); <i>p</i> < 0.001
Intravenous catheter	540 (3.4%)	66 (16.2%)	5.45 (4.12–7.17); <i>p</i> < 0.001
Parenteral nutrition	94 (0.6%)	13 (3.2%)	5.48 (3.04–9.87); <i>p</i> < 0.001
Gastrostomy or jejunostomy tube	346 (2.2%)	29 (7.1%)	3.41 (2.30–5.04); <i>p</i> < 0.001
Foley catheter	594 (3.8%)	27 (6.6%)	1.81 (1.21–2.69); <i>p</i> = 0.004
Insurance: private/none	6108 (38.9%)	133 (32.7%)	1.13 (0.82–1.19); <i>p</i> = 0.529
Medicare	6725 (42.8%)	222 (54.6%)	
Medicaid	2876 (18.3%)	52 (12.8%)	
OASIS data^a			
Severe pain (M1240)	3999 (25.5%)	84 (20.6%)	0.76 (0.60–0.97); <i>p</i> = 0.028
Dyspnea (M1400)	9086 (57.8%)	253 (62.2%)	1.20 (0.98–1.47); <i>p</i> = 0.082
Wound or pressure ulcer at least Stage 2 or unstageable (M1324)	839 (5.3%)	30 (7.4%)	1.41 (0.97–2.06); <i>p</i> = 0.075
Patients with an admission in the previous 30 days	2293 (14.6)	64 (15.7)	0.64 (0.45–0.89); <i>p</i> = 0.006
Memory deficit (M1740–1741)	1007 (6.4%)	40 (9.8%)	1.59 (1.14–2.22); <i>p</i> = 0.006
Decision making deficit (M1740–1742)	715 (4.6%)	42 (10.3%)	2.41 (1.74–3.35); <i>p</i> < 0.001
# of Activities of Daily Living for which assistance is needed (M1800–1870): ^b			
0	742 (4.7%)	30 (7.4%)	1.27 (1.21–1.33); <i>p</i> < 0.001
1	2600 (16.6%)	29 (7.1%)	
2	1323 (8.4%)	20 (4.9%)	
3	1950 (12.4%)	26 (6.4%)	
4	1987 (12.7%)	29 (7.1%)	
5	1344 (8.6%)	24 (5.9%)	
6	3007 (19.1%)	43 (10.6%)	
7	1565 (10%)	41 (10.1%)	
8	2091 (13.3%)	165 (40.6%)	
Impaired understanding of verbal content (M1220):	2148 (13.7%)	144 (35.4%)	3.45 (2.81–4.26); <i>p</i> < 0.001

^aNumbers correspond to OASIS items/ranges of items.

^bGrooming, dressing upper body, dressing lower body, bathing, toilet transferring, toilet hygiene, transferring, feeding. OASIS, Outcome and Assessment Information Set.

and Hospice Services). Patients were eligible if they were discharged from one of the three health system hospitals and were admitted to either a home care program or a palliative home care program. Both programs are paid for via skilled home care billing, and thus both require a skilled care need and homebound status. Therefore a patient who meets these criteria might be referred to either program. Referral decisions are made based on the provider’s perceptions of a patient’s needs, and those with greater needs are preferentially referred to palliative care. However the programs differ in three ways. First, the palliative home program is staffed by hospice nurses rather than by home care nurses. Second, palliative care patients are discussed biweekly in interdisciplinary team meetings that include the patient’s nurse as well as a physician, chaplain, and social worker. Third, palliative care patients have access to a telephone triage line that provides 24-hour access to a hospice nurse. There is no requirement that palliative care patients embrace a plan of comfort care or that they forgo any treatment.

Data collection

This study used data from the programs’ electronic health record system (HomeWorks, Cerner Inc., Kansas City, MO). These data included basic demographic variables (age,

gender, race, ethnicity) and admitting diagnosis and clinical data elements that are used for the national homecare Outcome Assessment Information Set (OASIS) (e.g., use of oxygen, Foley catheter, presence of a pressure ulcer, visit frequency).¹⁷ We followed patients using medical record reviews in the home care electronic medical record system for up to 30 days to determine whether they were admitted to any hospital. We included all admissions, because most 30-day measures imposed by payers do not distinguish between planned and elective admissions.

Analysis

First we examined patient characteristics present at the time of program assignment (palliative care versus home care). We used theory-based logistic regression models to examine bivariate associations and then to identify independent predictors of group assignment. We considered variables for inclusion if they reached a moderate level of significance (*p* < 0.25).¹⁸ We included variables that were likely to be associated with group assignment,¹⁹ choosing the model with the best Bayes Information Criterion.²⁰ We then used this model to calculate a propensity score that reflects the probability that a patient would be assigned to palliative care.

We used this propensity score and the Mahalanobis matching procedure to identify up to four matched home care patients for every palliative care patient.²¹ We then compared palliative and home care patients with respect to other variables (see Table 1) across deciles of propensity score, adjusting the propensity model to achieve the smallest possible differences between the two groups.²² We calculated the average treatment effect on treated patients (ATT),²³ which is a measure of the impact of palliative care on 30-day readmission, compared to what their readmission rates would have been in the home care group. Stata statistical software version 11.0 (StataCorp., College Station, TX) was used for all statistical analysis. The University of Pennsylvania's institutional review board approved the use of secondary data for this study.

Results

The original sample included 406 palliative home care patients and 15,709 routine home care patients from three participating hospitals. The characteristics of this sample are described in Table 1. Groups had similar 30-day readmission rates (palliative care: 36/406, 8.9%; home care 1745/15,709, 11.1%) (odds ratio 0.78, 0.54–1.10; $p=0.155$).

In the final propensity score model we adjusted for diagnosis (cancer versus other), Do Not Resuscitate (DNR) order, age, and insurance (Medicare, Medicaid, private, uninsured). The propensity score also included the number of activities of daily living for which at least partial assistance was required (score 0–8: grooming, dressing upper body, dressing lower body, bathing, toilet transferring, toilet hygiene, transferring, feeding) (OASIS M1800-1870). The score also included dichotomous variables for impaired memory (OASIS M1740-1), impaired decision making (OASIS M1740-2), impaired understanding (OASIS M1220), shortness of breath (M1400), severe pain (M1240), a pressure ulcer (M1324), and previous hospitalization in the past 30 days. The propensity score model had an Receiving Operating Characteristic area of 0.90, indicating good ability to distinguish between the palliative care and home care groups.

Of 406 palliative care patients, matches (up to 4 each) were identified for 391 (96%). Of 15,709 home care patients, 890 were used at least once as a match for palliative care patients, for a total final sample of 1282. Mortality rates (death within 30 days) were essentially identical in the two matched groups (home care: 8/890, 0.9%; palliative care: 4/392; 1.0%).

Using the matched sample we calculated the average treatment effect for treated patients. Because the propensity score included a large number of variables that are likely to be associated with 30-day readmissions,¹⁹ initial analysis used only the propensity score match, without additional attempts to adjust for risk. In this sample, palliative care patients had a 30-day readmission probability of 9.1% compared to a probability of 17.2% in the home care group (mean ATT: 8.3%; 95% CI 8.0–8.6). We also repeated this analysis in the matched sample after adjusting for three patient characteristics that were independent predictors of 30-day rehospitalizations. These included the presence of an intravenous catheter (OR 1.21, 95% CI 1.05–1.35, $p=0.002$); pain (OR 1.34, 95% CI 1.22–1.46, $p=0.014$); dyspnea (OR 1.43, 95% CI 1.34–1.54, $p=0.003$); and presence of a wound (OR 1.61, 95% CI 1.53–1.69, $p<0.001$). In a multivariable model that included these variables, the mean ATT was similar (8.5%; 95% CI 8.1–8.9).

The mean visit frequency for palliative care patients was greater than that for home care patients in the matched sample (0.74 visits/day versus 0.23 visits/day). However after adjusting for visit frequency, the ATT was still significantly different from zero (8.0%; 95% CI 7.6–8.4), suggesting that visit frequency does not play a substantial role in the reduction of 30-day readmissions.

Discussion

The results of this study suggest that palliative home care might be able to reduce rates of 30-day readmissions. Previous studies have found that patients prefer to remain at home whenever possible, both for treatment of an acute illness and near the end of life.^{24–26} Therefore, the observed reduction in 30-day readmissions suggests that in addition to potential cost savings, palliative home care programs may have the potential to improve patient-centered outcomes.²⁷

This study has two limitations that should be noted. First, propensity score matching cannot account for unmeasured differences. For instance, it is possible that the palliative care patients had less aggressive treatment preferences than the home care patients did. However, the palliative care program does not require that patients focus on comfort care. In addition, we included DNR status in the propensity score match, providing some equivalency between the two groups. Second, it is not clear how palliative care might reduce 30-day readmissions. Indeed, it is likely that a reduction in 30-day readmissions is achieved through multiple mechanisms.^{7–9}

Further research is needed to better define and understand the impact of palliative home care on outcomes. Particularly with the advent of ACOs and bundled payments,^{16,28} palliative care's potential contributions could be substantial. Therefore, it will be essential to define palliative care's role in achieving outcomes that are important to health systems, payers, and patients.

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