

## Impact of an Inpatient Palliative Care Team: A Randomized Controlled Trial

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### ABSTRACT

**Background:** Palliative care improves care and reduces costs for hospitalized patients with life-limiting illnesses. There have been no multicenter randomized trials examining impact on patient satisfaction, clinical outcomes, and subsequent health care costs.

**Objective:** Measure the impact of an interdisciplinary palliative care service (IPCS) on patient satisfaction, clinical outcomes, and cost of care for 6 months posthospital discharge.

**Methods:** Multicenter, randomized, controlled trial. IPCS provided consultative, interdisciplinary, palliative care to intervention patients. Controls received usual hospital care (UC).

**Setting and sample:** Five hundred seventeen patients with life-limiting illnesses from a hospital in Denver, Portland, and San Francisco enrolled June 2002 to December 2003.

**Measures:** Modified City of Hope Patient Questionnaire, total health care costs, hospice utilization, and survival.

**Results:** IPCS reported higher scores for the Care Experience scale (IPCS: 6.9 versus UC: 6.6,  $p = 0.04$ ) and for the Doctors, Nurses/Other Care Providers Communication scale (IPCS: 8.3 versus UC: 7.5,  $p = 0.0004$ ). IPCS patients had fewer intensive care admissions (ICU) on hospital readmission (12 versus 21,  $p = 0.04$ ), and lower 6-month net cost savings of \$4,855 per patient ( $p = 0.001$ ). IPCS had longer median hospice stays (24 days versus 12 days,  $p = 0.04$ ). There were no differences in survival or symptom control.

**Conclusions:** IPCS patients reported greater satisfaction with their care experience and providers' communication, had fewer ICU admissions on readmission, and lower total health care costs following hospital discharge.

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## INTRODUCTION

CARE OF PATIENTS with advanced illness has been recognized as suboptimal.<sup>1–8</sup> Particularly in hospital settings, patients and families have reported inadequate pain and symptom relief as well as unwanted life-sustaining treatment at the end of life.<sup>9–11</sup> Assistance for patients and families as they attempt to understand complex medical information including prognosis and treatment options appears to be less than adequate.<sup>12</sup> Hospice referrals tend to be initiated late in the course of illness despite the positive association between hospice length of stay and family perceptions of the benefits.<sup>13–15</sup>

In recent years, hospital-based palliative care (PC) programs have been developed to address these deficiencies.<sup>16–20</sup> These interventions are designed to improve symptom management, help patients and families better understand prognosis and treatment options, clarify goals of care, and assist in planning for disease progression.<sup>21–24</sup>

Interdisciplinary PC teams are believed to be particularly helpful in addressing the full spectrum of patients' health, spiritual, and psychosocial needs, and aligning treatment choices with patients' values and goals.<sup>25</sup>

Evidence of the effectiveness of interdisciplinary inpatient PC in improving clinical outcomes, satisfaction with hospital care, and use of hospice is limited.<sup>25–31</sup> Information on subsequent health services utilization is even less available.<sup>28,32–34</sup> There have been no prospective, multisite, randomized control trials to assess the efficacy of inpatient PC interventions.<sup>28,38–43</sup>

We hypothesized that an interdisciplinary inpatient palliative care consultative service (IPCS) would demonstrate improved symptom control, increase patient satisfaction with care and decrease the cost of health services received over the subsequent 6 months after hospital discharge.

## METHODS

### *Study design, protocol, and randomization*

IPCS was a three-site, prospective, randomized trial comparing outcomes of an IPCS to usual care (UC) in patients hospitalized with a life-limiting illness. Enrollment occurred between June 2002 and December 2003. Eligible patients were members of the same integrated health plan from three regions: Denver, Colorado, San Francisco, California, and Portland, Ore-

gon. The study was approved by the Institutional Review Boards of the health plan and hospitals.

Eligible patients were 18 or more years of age, hospitalized with at least one life-limiting diagnosis, and whose attending physician indicated they "would not be surprised if the patient died within 1 year." The effectiveness of this question in identifying patients who were appropriate for palliative care services has been reported previously.<sup>44–47</sup> Patients were excluded if they had impaired cognitive status and no surrogate or were currently enrolled in hospice or other PC studies. Referrals were received from all medical services and inpatient units. Study enrollment occurred Monday through Friday.

Written informed consent was obtained from the patient or proxy before study participation and randomization. After a baseline questionnaire was administered the patient was randomly assigned to IPCS or UC using a computer-generated, randomized assignment list for each site. Following study randomization, IPCS was initiated for those patients randomly assigned to the intervention arm.

San Francisco and Portland hospitals were part of a managed care organization's (MCO) delivery system. Denver's community hospital had a contract with the MCO. The hospital size was 102, 225, and 383 beds, respectively. All hospitals had MCO hospitalist physicians. At two sites hospitalists served as the attending physicians. Portland's hospital used a combination of MCO hospitalists and primary care internists. The majority of Portland patients (72%) were followed by hospitalists. All hospitals had social workers and chaplains on staff that provided direct patient services to UC patients.

### *Description of the IPCS program*

The IPCS teams included a palliative care physician and nurse, hospital social worker and chaplain. In Denver and Portland the teams were newly formed for the study while San Francisco's team had been operating for a year. All teams provided care in accordance with key palliative care components which were adapted from Weismann (Table 1).<sup>48</sup> The teams assessed patients' needs for symptom management, psychosocial and spiritual support, end-of-life planning, and post-hospital care. All of the team's efforts were based on the patient's individual goals of care.

The team met prior to each consultation to share what was known about the patient from the medical record, baseline questionnaire, and hospital providers. The entire team then met with the patient/family to address symptoms, diagnosis, prognosis, and goals of

TABLE 1. COMPONENTS AND CORE FEATURES OF A PALLIATIVE CARE CONSULT<sup>a</sup>

<i>Components</i>	<i>Core features</i>
<b>Setting the stage:</b> Assessment of the patient/family knowledge and perception of disease treatment and prognosis	Ask what s(he) knows or perceives Ask what s(he) wants to know
<b>Discussion of medical issues</b>	Summarize current medical issues, including current diagnosis, treatments and prognosis
<b>Assisting patient to identify personal goals for end-of-life care</b>	Review what is important to patient e.g., comfort and pain control, going home, further curative treatments, life at all costs Assist patient to decide which treatments are advancing the goals of care and which are adding unnecessary burden Address patient wishes for intensity of intervention at EOL, i.e., DNR vs. other Identify surrogate decision marker
<b>Assessment and management of physical symptoms</b>	Review of symptoms and probable etiologies Assessment of symptom intensity and patient goals for symptom relief Assessment and subsequent reassessment of current treatment strategies Recommendations for symptom management
<b>Assessment and management of psychological, spiritual, and practical needs:</b> fear of dying, anxiety about afterlife, denial of impending death, concerns about family and finances, patient support systems, and search for meaning	Assessment of the presence and intensity of these and other issues; how they may affect decision making Development of intervention strategies Help to normalize feelings, provide information, encourage short-term goal setting Facilitate family meetings Work with other providers involved in the patient's care
<b>Assessment of discharge planning issues:</b> determining options for EOL care and communicating that plan to other involved agencies and clinicians and other providers	Financial sources of support What is expected prognosis Document patient/family goals of care What are patient's symptom control needs (assistance, technology, training) Discharge disposition What level and kinds of support are available outside the hospital Is a caregiver(s) present and what support is available to the caregiver Financial sources of support

<sup>a</sup>Adapted from Wesisman.<sup>48</sup>

EOL, end of life; DNR, do not resuscitate.

care. Psychosocial and spiritual concerns were identified and advance directive forms were discussed. After the patient/family meeting, the team convened briefly to synthesize a palliative care plan and organize follow-up by team members. IPCS provided consultation on intervention patients to the attending, involved subspecialists and staff on all aspects of PC, including treatment recommendations. The team was available Monday through Friday. A PC physician was on call after hours.

The teams collaborated with the attendings and discharge planners in preparing for the patient's dis-

charge. The PC discharge plan was communicated to the primary care physicians through documentation in an electronic medical record. If intervention patients were readmitted to the hospital they were again followed by IPCS for PC needs.

To ensure treatment consistency there were bi-weekly telephone conferences among the three sites to review cases and promote protocol adherence. Each site was visited early in the study to assess protocol adherence, and intervention patients' medical records were reviewed to ensure that all treatment components were addressed.

### *Study outcomes and measures*

The primary study outcomes were symptom control, levels of emotional and spiritual support, patient satisfaction, and total health services costs at 6 months postindex hospitalization. Secondary measures included survival, number of advance directives (ADs) at discharge, and hospice utilization within the 6 months postindex hospitalization (hospitalization during which study enrollment occurred).

Surveys were administered to patients or proxies at study enrollment and within 2 weeks following index hospitalization discharge to measure symptom control as well as emotional and spiritual support. Patient satisfaction was also measured within 2 weeks of index hospital discharge. Proxies were instructed to answer the survey items as they thought the patient would.

Symptom severity was measured using the Physical Area scale of the Modified City of Hope Patient Questionnaires (MCOHPQ).<sup>51</sup> The Physical Area scale addresses pain, fatigue, sleep changes, nausea, constipation, diarrhea, dry mouth, change in appetite, and shortness of breath. Higher scores indicated greater symptom severity.

Patients rated their emotional and spiritual support using items taken from the MCOHPQ Emotional/Relationship Area and Spiritual Area scales.<sup>51</sup> Emotional support items included: anxiety, burden to family, support they received, isolation, opportunity to discuss illness and possible death, and treatment wishes/goals. Higher scores indicated greater emotional burden. Spiritual support included: the importance of participation in spiritual or religious experiences from the Spiritual Area scale, and two items developed by the investigators: ability to find meaning in one's life, and support given by religion or spiritual belief. Higher scores reflected greater support.

The patient's satisfaction with their inpatient experience was measured by the MCOHPQ Place of Care Environment scale and the Doctors, Nurses/Other Care Providers Communication scale.<sup>51</sup> The Place of Care Environment scale addressed experiences receiving pain management and symptom relief, psychological and social support, discharge planning, and end-of-life planning. Higher values indicated more positive feelings. The Doctors, Nurses/Other Health Care Providers Communication scale addressed the level of caring and respect a patient felt from their providers, as well as the opportunity, ease, and the level of understanding the patient had with their providers.

Higher scores represented greater caring, respect and understanding between patients and their providers. A composite score for each scale was computed by summing the scores for all items in a scale and di-

viding the sum by the number of items completed. Cronbach  $\alpha$ , a measure of internal consistency was computed for each scale. Cronbach  $\alpha$  were: 0.66 for Physical scale, 0.18 for Emotional/Relationship scale, 0.65 for Spiritual scale, 0.65 for the Place of Care Environment scale, and 0.65 for the Doctors, Nurses/Other Health Care Providers Communication scale. These  $\alpha$  indicate fair agreement among the individual items for the Physical and Spiritual scales but a lack of agreement for the Emotional/Relationship scale.

Physical performance was measured using the Eastern Cooperative Oncology Group performance scale (ECOG).<sup>52</sup> The total number of comorbidities, a measure of disease burden, was obtained with the RxRisk score program. This program uses a patient's prior 12 months of prescriptions to identify the presence of distinct chronic diseases based on common medications prescribed for each chronic disease.<sup>53</sup>

Costs were computed for all health services used within the 6 months following index hospitalization discharge. These services included emergency department, clinic, hospital outpatient, and home health visits, hospital readmissions, skilled nursing facility admissions, and pharmacy fills. Costs of health services were assigned using the predetermined internal MCO rate structure and vendor contracts based on *per diem* and case rate calculations. ICU admission data was only available for the Denver and San Francisco sites. The cost of each palliative care team was computed based on the total time for each team member multiplied by the team member's hourly wage and benefits.

Hospice measures included the number of patients enrolled in hospice, the number of days from study enrollment to hospice enrollment, and hospice length of stay (LOS). All measures, including mortality, were obtained from the MCO's databases using standard data extract protocols.

### *Statistical analyses*

All analyses were performed using SAS 9.1 (SAS Institute Inc., Cary, NC). A  $p$  value = 0.05 was significant. Categorical variables were summarized as percentages; continuous variables as means or medians (for skewed data). Continuous measures for IPCS and UC patients were compared using  $t$  tests for normally distributed measures and Wilcoxon two-sample tests for measures with skewed distributions. Categorical measures were tested using  $\chi^2$  tests or Fisher's exact test. All time to event measures (e.g., survival, days to hospice admission) were analyzed using Cox proportional hazard models.

Patients with life-limiting illnesses often have physical and cognitive limitations that necessitate the use

of proxies, which was the case in this study. We report the combined patient and proxy survey data here because analysis of the separate patterns of patient and proxy responses to the scales were similar.

Comparisons in total health costs between the IPCS and UC group used a non-linear model with a negative binomial distribution and log link. Costs were not transformed because the log link accounts for skewed distributions. The model was adjusted for site, age, gender, and the number of days a patient could use medical services. Costs are presented as total costs per patient. IPCS team costs were included in the net costs savings.

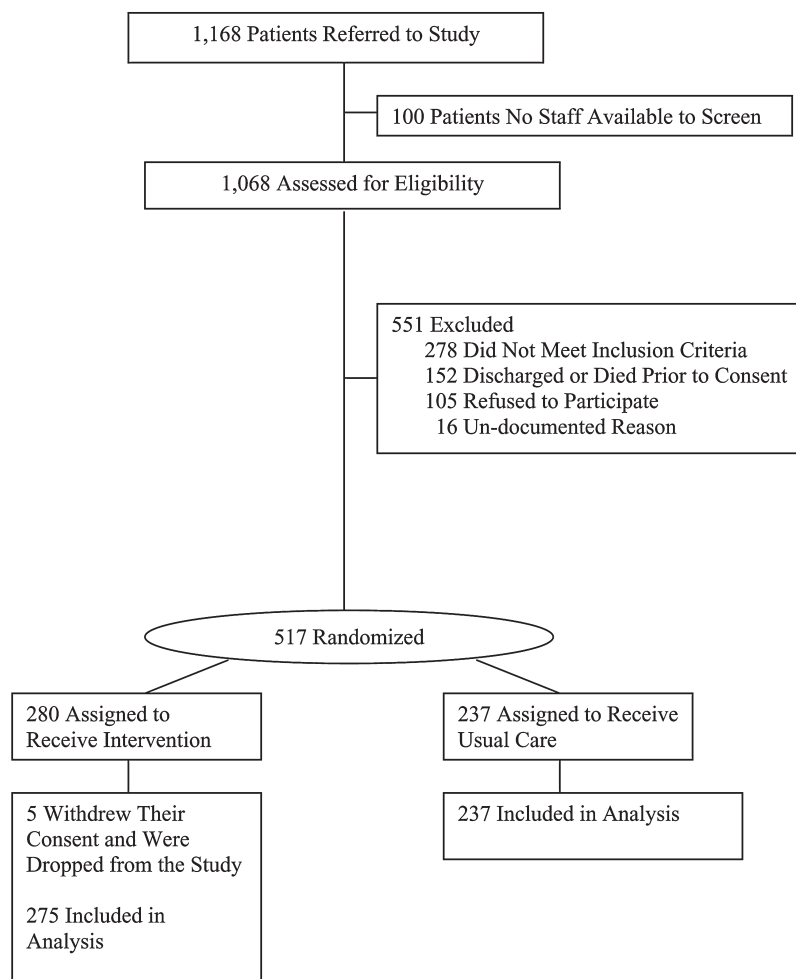
## RESULTS

The IPCS received 1168 referrals for study enrollment (Fig. 1). Five hundred fifty-one patients did not

meet inclusion criteria (cognitive impairment with no surrogate, were currently enrolled in hospice or other PC studies, or the attending did not approve study participation), were discharged or died prior to informed consent, refused to participate, or were excluded for un-documented reasons (Fig. 1). We randomly assigned 517 patients to IPCS ( $n = 280$ ) or UC ( $n = 237$ ). Five IPCS patients withdrew prior to the initiation of IPCS services at the encouragement of a family member, resulting in 275 IPCS patients. No patients were lost to follow-up.

### *Patient characteristics*

Baseline characteristics are presented in Table 2. There were no differences in any baseline measures between the IPCS and UC groups except for the life-limiting diagnoses of stroke and end-stage renal disease (ESRD).



**FIG. 1.** Inpatient palliative care study patient enrollment.



TABLE 2. PATIENT CHARACTERISTICS AT STUDY ENROLLMENT

Measure	IPCS (n = 275)	Usual care (n = 237)	p value
Advance directives at study enrollment	158 (53.38)	138 (62.2)	0.53 <sup>a</sup>
Age, mean (SD)	73.6 (12.6)	73.1 (13.2)	0.68 <sup>b</sup>
Comorbidities at study enrollment, mean (SD)	3.2 (2.2)	3.5 (2.3)	0.11 <sup>b</sup>
Composite physical area scale at study enrollment, mean (SD)	5.2 (1.8)	5.1 (1.8)	0.72 <sup>b</sup>
Composite emotional/relationship area scale at enrollment, mean (SD)	6.3 (1.9)	6.2 (1.7)	0.67 <sup>b</sup>
Composite spiritual area scale at enrollment, mean (SD)	6.8 (2.7)	6.5 (3.0)	0.27 <sup>b</sup>
ECOG score, median (interquartile range)	2 (2.3)	2 (2.3)	0.68 <sup>c</sup>
Quality of life, median (interquartile range)	4 (1.7)	4 (2.6)	0.93 <sup>c</sup>
Female, Number, number (%)	162 (59)	121 (51)	0.07 <sup>a</sup>
Life-limiting diagnosis, number (%)			
Cancer	64 (27.3)	95 (34.4)	0.09 <sup>a</sup>
CHF	21 (8.9)	17 (6.2)	0.24 <sup>a</sup>
MI	3 (1.3)	6 (2.2)	0.52 <sup>a</sup>
Other heart disease	7 (3.0)	3 (1.1)	0.20 <sup>a</sup>
COPD	31 (13.2)	35 (12.7)	0.86 <sup>a</sup>
Other pulmonary disease	3 (1.3)	3 (1.1)	1.00 <sup>a</sup>
ESRD	10 (4.3)	2 (0.7)	0.02 <sup>a</sup>
Organ failure	29 (12.3)	28 (10.1)	0.48 <sup>a</sup>
Stroke	20 (8.5)	10 (3.6)	0.02 <sup>a</sup>
Dementia	8 (3.4)	13 (4.7)	0.51 <sup>a</sup>

<sup>a</sup> $\chi^2$  for proportions or Fisher's exact test (for tables with uneven margins and/or cells within  $n = 5$ ).

<sup>b</sup>*t* test.

<sup>c</sup>Wilcoxon two-sample test.

IPCS, inpatient palliative care service; SD, standard deviation; ECOG, Eastern Cooperative Oncology Group; CHF, congestive heart failure; COPD, chronic obstructive pulmonary disease; MI, myocardial infarction; ESRD, end-stage renal disease.

### Index hospitalization

Number of days from index hospital admission to study enrollment, days from enrollment to hospital discharge, and hospital LOS did not differ between the IPCS and UC patients (Table 3). There was no difference in mean total costs between groups for their index hospitalization (IPCS: \$20,783; UC: \$15,841,  $p = 0.08$ ).

### Hospice use

IPCS patients had significantly longer median hospice stays than UC participants (IPCS: 24 days; UC: 12 days,  $p = 0.04$ ; Table 3). The median days from study enrollment to hospice admission was 1 day shorter for IPCS patients compared to UC patients but the difference was not significant ( $p = 0.14$ ). The percentage of patients admitted to hospice did not differ ( $p = 0.50$ ).

### Advance directives

While there was no difference in the number of ADs at study enrollment (Table 2), IPCS patients completed significantly more ADS at hospital discharge than UC patients (91.1% vs. 77.8%;  $p < 0.001$ ; Table 3).

### Survival

There was no difference in survival between IPCS and UC. Median post enrollment survival was 30 days for IPCS and 36 days for UC ( $p = 0.08$ ), and 173 IPCS patients (63%) and 132 UC patients (56%) died during the study period ( $p = 0.08$ ). Significantly more IPCS patients (17.1%) died during their index hospitalization compared to UC patients (8.0%;  $p = 0.002$ ; Table 3).

### Symptoms, emotional, spiritual support, and quality of life

IPCS and UC mean enrollment and discharge scores for the Physical, Emotional/Relationship, Spiritual Area composite scales as well as the Quality of Life scale are shown in Table 4. There were no differences between groups for any scale.

### Satisfaction with hospital care and providers

The IPCS group reported higher mean satisfaction for both the Place of Care Environment scale (IPCS: 6.8; UC: 6.4,  $p < 0.01$ .) and the Doctors, Nurses/Other

TABLE 3. COMPARISONS FOR THE INDEX HOSPITALIZATION, ADVANCE DIRECTIVES, HOSPICE USE, AND SURVIVAL

Measure	IPCS (n = 275)	Usual care (n = 237)	p value
Admission to study enrollment (days), median (interquartile range)	3 (2,7)	4 (2,7)	0.36 <sup>a</sup>
Study enrollment to discharge or death in the hospital (days), median (interquartile range)	3 (1,6)	2 (1,5)	0.10 <sup>a</sup>
Index Hospital length of stay (days) median (interquartile range)	7 (4,12)	7 (4,12)	0.57 <sup>a</sup>
Study enrollment to hospice admission (days), median (interquartile range)	2 (0,23)	3 (0,37)	0.09 <sup>a</sup>
Survival from study enrollment (days), median (interquartile range)	30 (6,104)	36 (13,106)	0.08 <sup>a</sup>
Survival from study enrollment for patients who did not die during index hospitalization, median (interquartile range)	43 (17,134)	43.5 (16,117)	0.80 <sup>a</sup>
Days to hospice, median (interquartile range)	2 (0,23)	3 (0,37)	0.14 <sup>a</sup>
Hospice length of stay (days), median (interquartile range)	24 (7,94)	12 (4,48)	0.04 <sup>b</sup>
Index Hospital length of stay (days) median (interquartile range)	7 (4,12)	7 (4,12)	0.57 <sup>b</sup>
Died during index hospitalization, number (%)	47 (17.1)	19 (8.0)	0.002 <sup>d</sup>
Advance directives at discharge, number (%) <sup>c</sup>	224 (91.1)	172 (77.8)	< 0.001 <sup>d</sup>
Died during study, number (%)	173 (62.9)	132 (55.7)	0.08 <sup>d</sup>
Patients admitted to hospice, number (%)	103 (37.1)	96 (40.7)	0.50 <sup>d</sup>
Total index hospitalization costs (\$), mean (SD) median	20,783 (40,088) 10,864	15,841 (18,959) 8,868	0.08 <sup>e</sup>

<sup>a</sup>Cox proportional hazards model.<sup>b</sup>Wilcoxon two-sample test.<sup>c</sup> $\chi^2$  test.<sup>d</sup>Patients with no advance directive at study enrollment: N: IPCS = 95, UC = 80. Not all subjects had a documented presence or absence of an advance directive at study enrollment.<sup>e</sup>Generalized linear model adjusted for age, gender, and study site.

IPCS, inpatient palliative care service; SD, standard deviation; ECOG, Eastern Cooperative Oncology Group performance scale.

Health Care Providers Communication scale (IPCS: 8.3; UC: 7.2,  $p < 0.001$ ; Table 5).

### Total health care expenditures

Total mean health costs for the IPCS group were lower by \$6,766 per patient compared to UC patients (IPCS: \$14,486; UC: \$21,252,  $p = 0.001$ ). After subtracting the cost of staffing the IPCS (\$1,911 per patient), the net savings was \$4,855 per patient. Cost savings were largely driven by a significant difference in hospital readmission costs (IPCS: \$6,421 per patient versus UC: \$13,275 per patient,  $p = 0.009$ ). There was no difference in the number of hospital readmissions but IPCS patients had significantly fewer ICU stays on readmission (IPCS: 12; UC: 21,  $p = 0.04$ ; Table 6).

## DISCUSSION

Key findings include greater IPCS patient satisfaction with hospital care and providers, longer hospice

length of stay, more advanced directives at index hospitalization discharge, no difference in overall survival, reduced ICU admissions on subsequent hospitalization, and lower total health costs.

We believe greater patient satisfaction was achieved due to IPCS addressing the patient's and family's need for information and facilitating their active participation in decisions regarding their medical care. Increased patient satisfaction has been reported from previous research on palliative care interventions.<sup>28,29,43</sup>

We found no differences in physical symptoms which is inconsistent with other studies on inpatient palliative care interventions.<sup>23,38,42,43</sup> In particular, we found no differences in pain symptoms from study enrollment to index hospitalization discharge. There are several possible explanations. First, patients in this study reported relatively low physical symptoms at study enrollment. The mean pain rating on a scale of 1 to 10 was 3.4 suggesting that pain was less than in other reported populations whose symptoms were more severe.<sup>23,42</sup> Second, the average index hospital-

TABLE 4. COMPOSITE BURDEN SCALE SCORES AT STUDY ENROLLMENT AND INDEX HOSPITALIZATION DISCHARGE FOR COMBINED PATIENT AND PROXY RESPONSES

Composite score	IPCS				Usual care				p value <sup>a</sup>
	Study enrollment Mean (SD)	n	Hospital discharge Mean (SD)	n	Study enrollment Mean (SD)	n	Hospital discharge Mean (SD)	n	
Physical area scale <sup>b</sup>	5.2 (1.8)	240	4.0 (1.7)	186	5.1 (1.8)	204	4.1 (1.8)	188	0.91
Emotional/relationship area scale <sup>c</sup>	6.3 (1.9)	243	7.0 (1.4)	184	6.2 (1.7)	206	6.7 (1.5)	177	0.07
Spiritual area scale <sup>d</sup>	6.8 (2.7)	254	6.6 (2.5)	202	6.5 (3.0)	216	6.2 (2.6)	189	0.55
Self-reported quality of life <sup>e</sup>	4.1 (3.3)	266	6.4 (2.3)	199	4.1 (3.1)	227	6.3 (2.1)	191	0.78

<sup>a</sup>Generalized linear model with hospital discharge score as the independent variable and the study enrollment score as covariate.

<sup>b</sup>11-point scale: 0 = no problem, 10 = severe problem; higher score = greater physical discomfort.

<sup>c</sup>11-point scale: 0 = none at all, 10 = completely; higher score = greater emotional burden.

<sup>d</sup>11-point scale: 0 = not at all, 10 = a great deal; higher score = greater importance attached to spiritual aspects of one's life.

<sup>e</sup>11-point scale: 0 = very bad, 10 = excellent.

IPCS, inpatient palliative care service; UC, usual care; SD, standard deviation.

ization LOS after study enrollment was 4.9 days, a shorter time for the IPCS team to manage complex physical symptoms compared to studies with longer interventions.<sup>23,42,43</sup> Finally our patient population survived for a longer period of time indicating they might be earlier in their disease state than other inpatient palliative care patients.<sup>34,58</sup>

There was no difference in the proportion of patients enrolled in hospice, but IPCS patients had longer hospice stays. MCOs have higher rates of hospice utilization and longer hospice stays compared to fee for service.<sup>55</sup> As all participants were MCO members, it is possible that IPCS would not be able to increase an already high hospice enrollment rate. Finally, patients and their families may not have considered hospice at their index hospitalization because this was not an option they felt necessary at this stage in the patient's illness.

We were not surprised that we had significantly more ADs at index hospital discharge because ADs were addressed with each intervention patient. Increased ADs subsequent to palliative care interventions is consistent with the literature.<sup>27</sup>

There was no difference in the number of inpatient readmissions between the IPCS and UC, but IPCS patients had lower inpatient readmissions costs. These lower readmission costs are partially explained by fewer ICU admissions. Reduced ICU admissions may have been due to more clearly defined patient goals of care and more effective communication of these goals in the medical record and through advance directives. Other studies have found decreased ICU admissions.<sup>34</sup>

Overall survival between IPCS and UC patients did not differ. However, more IPCS patients died during their index hospitalization, which was attributed to a

TABLE 5. COMPOSITE SATISFACTION SCALE SCORES INDEX AT INDEX HOSPITALIZATION DISCHARGE FOR COMBINED PATIENT AND PROXY RESPONSES

Composite score	IPCS		Usual care		p value <sup>a</sup>
	Mean (SD)	n	Mean (SD)	n	
Place of care environment scale <sup>b</sup>	6.8 (1.0)	156	6.4 (1.1)	139	< 0.001
Doctors, nurses/other health care providers Communication scale <sup>c</sup>	8.0 (1.4)	185	7.4 (1.7)	156	< 0.001

<sup>a</sup>Generalized linear model.

<sup>b</sup>11-point scale: 0 = none at all, 10 = completely; higher score = greater positive feeling about care environment.

<sup>c</sup>11-point scale: 0 = not at all, 10 = a great deal; higher score = greater communication between patient and providers.

IPCS, inpatient palliative care service; UC, usual care; SD, standard deviation.



TABLE 6. TOTAL HEALTH CARE COSTS PER PATIENT AND THE NUMBER OF ICU ADMISSIONS FOR SIX MONTHS FOLLOWING INDEX HOSPITALIZATION

Measure	IPCS (n = 230)		Usual care (n = 218)		Mean difference (usual care minus IPCS)	p value <sup>a</sup>
	Mean (SD)	Median (interquartile range)	Mean (SD)	Median (interquartile range)		
Total health care costs (\$)	14,486 (17,361)	2,202 (205–14,070)	21,252 (25,197)	3,429 (284–16,783)	6,766	0.001
ICU admissions <sup>b</sup> (Number)		12		21	9	0.04

<sup>a</sup>Nonlinear two-part model for cost;  $\chi^2$  for ICU admissions.

<sup>b</sup>Denver and San Francisco only.

ICU, intensive care unit; IPCS, inpatient palliative care service; SD, standard deviation.

difference at one site. IPCS patients at this site had a median 3 day longer hospital stay than the UC group. This site's team reported difficulty transitioning patients to other care venues near the end of life. There was no difference in mortality between IPCS and UC patient over a 14-day period postenrollment, whether or not they were still hospitalized, indicating that overall mortality was not different at that site.

The IPCS intervention did not vary among sites with respect to the components or core features of the intervention. However, uniqueness in the hospital culture, variability in palliative care staffing levels, patient support available at discharge, individual team members' palliative care experience, and the functionality and maturity of each team did vary between sites as would be expected. Further study would be needed to understand if any of these factors might affect patient outcomes.

Other areas that would benefit from future research include which components of the palliative care intervention are most effective in achieving positive outcomes and how to apply the interdisciplinary palliative care team in other care settings.

We identified two study limitations. One limitation of the study was the lack of some measurable process measures, e.g., what symptoms and issues were helped by which components of the IPCS. A second limitation was participants in this study were members of a health plan with an integrated medical delivery system which may limit generalization of study outcomes in other settings.

This study provides evidence for the positive impact of IPCS consultations on satisfaction with care and decreased health care costs. It also contributes new information on the impact of this service on ICU admissions and hospice utilization. Based on this data, all three sites are continuing to offer palliative care to hospitalized members. In addition, the integrated

health plan is implementing new IPCS programs nationally.

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## ABSTRACTS

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