What's the Plan? Needing Assistance with Plan of Care Is Associated with In-Hospital Death for ICU Patients Referred for Palliative Care Consultation

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Abstract

To inform earlier identification of intensive care unit (ICU) patients needing palliative care, we examined factors associated with in-hospital death among ICU patients (N=260) receiving palliative care consultations at a 542-bed tertiary care hospital (2005-2009). High pre-consultation length of stay (LOS, ≥7 days) (adjusted odds ratio (aOR)=5.0, 95% confidence interval (95% CI)=2.5-9.9, P<.01) and consultations for assistance with plan of care (aOR=11.6, 95% CI=5.6-23.9, P<.01) were independently associated with in-hospital death. Patients with both consultation for plan of care and high pre-consult LOS had the highest odds of in-hospital death (aOR=36.3, 95% CI=14.9-88.5, P<.001), followed by patients with consultation for plan of care and shorter pre-consult LOS (aOR=9.8, 95% CI=4.3-22.1, P<.001), and patients with long pre-consult LOS but no consultation for plan of care (aOR=4.7, 95% CI=1.8-12.4, P=.002). Our findings suggest that ICU patients who require assistance with plan of care need to be identified early to optimize end-of-life care and avoid in-hospital death.

Keywords

Prognosis, Death, Intensive Care Unit, Palliative Care, Referral, and Consultation

Introduction

Previous studies reported that 59% to 91% of the general population prefers to die at home.[1,2] However, preferred and actual place of death are frequently incongruent.[2-4] Hospital death is common, and previous studies have found that over 50% of patients died in hospitals,[4-7] with even higher rates among non-white ethnicities.[8]

Patients in intensive care units (ICU) are at especially high risk for in-hospital death compared to non-ICU hospital patients.[9,10] Providing palliative care for ICU patients is an important goal for palliative care providers in the hospital.[11] Often, the ICU is an important site for providers to initiate discussions regarding the patient's and family's goals of care.[12] Hospital death may be avoidable if patients at high risk for dying can be identified and appropriate plans made for safe discharge to a desired location, such as home with hospice care.

ICU patients with certain conditions, such as global cerebral ischemia, stage IV malignancy, and status post cardiac arrest are at high risk for in-hospital death.[9,11,13] However, research on the risk of in-hospital mortality for ICU patients receiving palliative care consultation has been limited to studies on intervention[14] or cost reduction.[15] We previously found that plan of care (POC) was associated with increased likelihood of in-hospital mortality among elderly patients receiving palliative care consultations on the medical floors.[16] Among elderly patients receiving palliative care consultations in the ICU, length of stay (LOS) but not POC was associated with in-hospital mortality.[16] There have been no previous observational studies comparing predictors of mortality in a general (not limited to elderly patients), non-surgical ICU population receiving palliative care.

The objective of this study was to compare factors associated with the outcome of in-hospital death for ICU patients receiving palliative care consultation. We hypothesized that the ICU patients at highest risk of in-hospital death required more assistance with POC and had longer pre-consultation lengths of stay than patients at lower risk of in-hospital death. The results of this study will guide palliative care services to identify patients at highest risk for in-hospital death, and add to the growing research on triggers for proactive palliative care consultation in the ICU.

Methods

Design, Participants, and Setting

Data was collected prospectively on all adult patients who received Pain and Palliative Care (PPC) consultations from January 1, 2005 through December 31,2009 (n=4,932). All consultations were performed at The Queen's Medical Center, a 542-bed community-based teaching hospital in Honolulu, Hawai'i that serves as the major tertiary care referral center for the Pacific basin. The hospital established an interdisciplinary PPC Department in 2004, building on an existing nurse-run pain management service. The department has two functions, pain management and palliative care, to meet the needs of patients with acute pain from surgical intervention or acute exacerbations of chronic pain, those with palliative care needs including management of pain and other symptoms, and POC needs related to progressive or life-limiting illness.[16,17] Among the 4,932 consultations performed from 2005 through 2009, 531 were for ICU patients. We excluded 229 ICU patients with surgical diagnoses who received consultations for post-operative acute pain management, patients who left the hospital against medical advice (n=2), and patients for whom the PPC team signed off before discharge (n=40), as data on survival to hospital discharge was not available. The final analytic sample consisted of 260 patients. The study was approved by the University of Hawai'i and the Queen's Medical Center Institutional Review Boards.

Data Collection

The PPC team prospectively collected data and recorded patient demographic characteristics, primary diagnosis, Karnofsky

score,[18] and pre-consultation hospital LOS in days at the time of consultation, and updated the information as the patients' care progressed. At the initial consultation visit, the palliative care physician or advanced practice nurse recorded one or more reasons for consultation, including pain, non-pain symptom management, and assistance with POC. Consultations for assistance with POC required more intense consultation and included prolonged higher-level palliative care team discussions with the patient, family, and medical team to clarify goals of care, appropriate use of medical interventions, disposition, and coordination of care. Non-POC consultations addressed straightforward management issues, were performed by a single team member, and generally required less time and fewer visits.

Outcomes

At the close of the consultation, the palliative care team recorded disposition after hospital discharge, including whether the patient survived to hospital discharge or died in the hospital. The main outcome of interest was death during that hospital admission among patients who received PPC consultation in the ICU.

Covariates

At the time of hospital admission, patients reported their race and ethnicity. Hawai'i has a uniquely diverse population with Japanese, Okinawan, Korean, Chinese, Filipino, East Indian, White, Native Hawaiian, part-Native Hawaiian, Micronesian, Pacific Islander, Hispanic, African American, Native American, Middle Eastern, and mixed races and ethnicities. The races were clustered into the four largest groups: Asian (including Japanese, Okinawan, Korean, Chinese, Filipino, East Indian, and "other Asian") (n=112), White (n=85), Native Hawaiian and Other Pacific Islander (NHOPI)(n=51), and other races or ethnicities (n=12), including African American, non-white Hispanic, and unknown.

Primary diagnosis was obtained from the medical record at the time of the initial consultation, determined by the PPC team to be the primary diagnosis related to the palliative consultation. These diagnoses were categorized as cancer, cardiac disease, pulmonary disease, other medical diagnoses (including liver disease, stroke/coma, renal disease, dementia, diabetes, and HIV/AIDS), and other diagnoses (not specified).

Consultation indication for assistance with POC was considered a measure of intensity of consultation and was analyzed as a dichotomous "yes/no" variable. Pre-consultation LOS was dichotomized as ≥7 days versus <7days.

Analyses

Baseline characteristics of patients were compared by survival to hospital discharge (yes vs no) using Chi-square analyses for categorical variables, and t-test analyses for continuous variables. Factors associated with in-hospital death were analyzed using multivariable logistic regression models, including only variables significant (P<.05) on univariate logistic regression analyses. Age, gender, and race were included in the model despite a non-significant P value on univariate analyses due to their importance with regard to death. The final multivariable logistic regression model examined the relationship between consultation for assistance with POC and pre-consultation LOS, by four categorical groups: intense consultation for assistance with POC and pre-consult LOS ≥7 days; intense consultation for assistance with POC and pre-consult LOS<7 days; consultation not for assistance with POC (this included less intense consultations for pain and/or symptom management only) and pre-consult LOS ≥7 days; and consultation not for assistance with POC and pre-consult LOS<7 days (reference group). All analyses were performed using SAS 9.2 (Cary, North Carolina).

Results

Baseline demographic and clinical characteristics by survival to hospital discharge (yes vs no) are displayed in Table 1. A total of 260 patients with non-surgical diagnoses received palliative care consultations in the ICU during the five calendar years from 2005 through 2009. Over 60% of patients who received palliative care consultation were aged 64 years old or younger and 43% were of Asian ethnicity. Cancer was the most common admission diagnosis (47.7%), followed by pulmonary disease (15.8%), cardiac disease (8.9%) and other medical conditions (8.5%). Assistance with POC was one of the indications for 49.2% of the palliative care consultations; the rest of the consultations were for pain and/or symptom management only but not assistance with POC. The mean total LOS was 22.9 days (median=12days), with a mean pre-consultation LOS of 10.0 days (median=4days), and a mean LOS after initial palliative consultation to discharge or in-hospital death of 12.8 days (median=7days).

Table 2 displays the unadjusted univariate models and the final multivariable logistic regression model of factors associated with in-hospital death (yes/no). Older age and high pre-consultation LOS were significantly associated with an increased likelihood of in-hospital death (aOR=2.89, 95% CI=1.10-7.57, P=.03 and aOR=5.00, 95% CI=2.52-9.90, P<.01 respectively), whereas primary admission diagnoses were not significantly associated. Having a consultation for assistance with POC was associated with over an 11-fold increased likelihood of in-hospital death (aOR=11.58, 95% CI=5.60-23.93, P<.01).

Table 3 displays the model examining the relationship between high pre-consultation LOS and consultation for assistance with POC on the outcome of in-hospital death. Having both high pre-consultation LOS and consultation for assistance with POC was associated with over a 36-fold increase in odds of in-hospital death (aOR=36.3, 95% CI=14.9-88.5, P<.001) compared to patients with low LOS and consultation for pain and/or symptom management without assistance with POC. Having only one of these two factors present was associated with lower but still significantly increased odds of in-hospital death(POC only, aOR=9.8, 95% CI=4.3-22.1, P<.001; LOS only, aOR=4.7, 95% CI=1.8-12.4, P=.002).

Table 1.Baseline Demographic and Clinical Characteristics for Whole Cohort, and by Survival to Hospital Discharge					
		Total (N=260)[a]	Survivor (%) (n=145, 55.8%)	Non-Survivor (%) (n=115, 44.2%)	*P*-Value
Age Group	≤64 years	160 (61.5)	102 (63.8)	58 (36.3)	.002
	65-74 years	56 (21.5)	27 (48.2)	29 (51.8)	
	≥75 years	44 (16.9)	16 (36.4)	28 (63.6)	
Gender	Male (%)	153 (58.9)	89 (58.2)	64 (41.8)	.351
	Female (%)	107 (41.2)	56 (52.3)	51 (47.7)	
Ethnicity[b]	White	85 (32.7)	56 (65.9)	29 (34.1)	.074
	Asian	112 (43.1)	61 (54.5)	51 (45.5)	
	NHOPI	51 (19.6)	23 (45.1)	28 (54.9)	
	Other	12 (4.6)	5 (41.7)	7 (58.3)	
Primary Admission Diagnosis	Cancer	124 (47.7)	57 (46.0)	67 (54.0)	.016
	Cardiac Disease	23 (8.9)	17 (73.9)	6 (26.1)	
	Pulmonary Disease	41 (15.8)	26 (63.4)	15 (36.6)	
	Other Medical[c]	22 (8.5)	11 (50.0)	11 (50.0)	
	Other	50 (19.2)	34 (68.0)	16 (32.0)	
Reason for Consultation	Pain or other symptom management only	130 (50.8)	111 (85.4)	19 (14.6)	<.001
	Plan of Care (POC)	126 (49.2)	34 (27.0)	92 (73.0)	
Mean hospital LOS (days±SD)		22.9±29.7	15.8±17.5	31.5±38.2	<.001
Mean Days before consultation (days±SD)		10.0±17.1	4.4±6.9	17.0±22.7	<.001
Mean Days from consultation to discharge/death (days±SD)		12.8±19.9	11.4±14.4	14.5±25.1	.211
Long Pre-consultation LOS (≥7 days)		103 (39.6)	30 (29.1)	73 (70.9)	<.001
Neither POC nor Long Pre-consult LOS		100 (39.6)	92 (92.0)	8(8.0)	<.001
Long Pre-consult LOS but not POC		30 (11.7)	19 (63.3)	11 (36.7)	
POC but no Long Pre-consult LOS		56 (21.9)	23 (41.1)	33 (58.9)	
POC and Long Pre-consult LOS		70 (27.3)	11 (15.7)	59 (84.3)	

[a]n (%), categorical; means + standard deviation, continuous. Not all numbers/percentages add up to totals due to missing data and rounding.
[b]NHOPI: Native Hawaiian and Other Pacific Islander. Other ethnicities (n=12, African American, non-white Hispanic, and unknown).
[c]Including liver disease, stroke/coma, renal disease, dementia, diabetes, and HIV/AIDS.
LOS=length of stay, POC=plan of care, SD=standard deviation

Table 2. Multivariate Logistic Regression: Factors Associated with In-Hospital Death

	Unadjusted Model				Adjusted Model			
	OR[a]	95% CI	P-value	Wald Chi square P-value	aOR	95% CI	P-value	Wald Chi square P-value
Age								
Age ≤64	1	Ref	Ref		1	Ref	Ref	
Age 65-74	**1.89**	**1.02-3.50**	**.04**	**<.01**	1.32	0.58-3.03	.51	.10
Age ≥75	**3.08**	**1.54-6.16**	**<.01**		**2.89**	**1.10-7.57**	**.03**	
Sex								
Female	1	Ref	Ref	.35	1	Ref	Ref	.84
Male	0.79	0.48-1.30	.35		1.07	0.54-2.14	0.84	
Ethnicity								
White	1	Ref	Ref		1	Ref	Ref	
Asian	1.61	0.90-2.89	.11	.08	0.57	0.25-1.31	.19	.27
NHOPI	**2.35**	**1.16-4.79**	**.02**		1.16	0.45-3.02	.76	
Other Ethnic Group	2.70	0.79-9.27	.11		1.75	0.34-9.06	.50	
Diagnosis								
Cancer Diagnosis	1	Ref	Ref		1	Ref	Ref	
Heart Diagnosis	**0.30**	**0.11-0.81**	**.02**	**.02**	0.57	0.16-1.98	.37	.51
Pulmonary Diagnosis	0.49	0.24-1.02	.06		0.49	0.17-1.36	.17	
Other Medical Diagnosis	0.85	0.34-2.11	.73		0.49	0.14-1.71	.26	
Other Diagnosis	**0.40**	**0.20-0.80**	**<.01**		0.56	0.21-1.46	.23	
High Pre- consultation LOS	**6.66**	**3.83-11.58**	**<.01**	**<.01**	**5.00**	**2.52-9.90**	**<.01**	**<.01**
Plan of Care	**15.81**	**8.46-29.56**	**<.01**	**<.01**	**11.58**	**5.60-23.93**	**<.01**	**<.01**

[a]OR= odds ratio (univariate). aOR= Adjusted odds ratio, controlling for age, sex, ethnicity, diagnosis, LOS, and Plan of Care.
LOS=length of stay, Ref=reference, NHOPI=Native Hawaiian and Other Pacific Islander, CI=confidence interval, OR=odds ratio

Table 3. Multivariate Logistic Model of Factors Associated with In-Hospital Death, Examining the Relationship Between High Pre-Consult Length of Stay and Consultation for Assistance with Plan of Care

	OR	95% CI	P-value
Age≥75years (Oldest vs <75 years)	2.5	1.1-5.8	.037
Cancer	1.7	0.9-3.3	.093
Not consulted for POC and Short LOS (<7 days)	Ref		
Long Pre-consult LOS but not Consulted for POC	4.7	1.8-12.4	.002
Consulted for POC but not Long Pre-consult LOS	9.8	4.3-22.1	<.001
Consulted for POC and Long Pre-consult LOS	36.3	14.9-88.5	<.001

OR=odds ratio, LOS=length of stay, POC=plan of care, Ref=reference, CI=confidence interval

Discussion

We found that pre-consultation LOS and POC indication for palliative care consultation were the two strongest predictors of in-hospital death for our ICU patients. When both of these factors were present, there was a more than additive effect on likelihood of in-hospital death.

To our knowledge, data are limited on predictors of in-hospital death in a general non-surgical ICU population receiving palliative care. Our previous work noted that among elderly patients in the ICU who received palliative care consultations, LOS but not POC was associated with increased likelihood of in-hospital death.[16] The current study found that both POC and LOS were associated with in-hospital mortality among non-surgical ICU adult patients (aged older than 18 years) receiving palliative care consults. We hypothesize that the difference in findings regarding significance of POC between these studies may be because of the different age groups examined in the two studies. The Sekiguchi study examined an older population,[16] and we suspect that for these older adults, once they were in the ICU for a long enough period of time (ie, seven days or longer), it was no longer relevant why the palliative care consultation was ordered, and the prognosis for these older patients was poor regardless of reason for consultation. In contrast, among the more mixed aged non-surgical ICU population in the present study, POC was a significant factor associated with hospital death, and when combined with LOS, was an even more powerfully associated with hospital death.

At least four previous studies have identified triggers for palliative care consultation for ICU patients.[11,13,19,20] High in-hospital death rates were reported for specific conditions in ICU patients, including global cerebral ischemia and multiple organ system failure.[11,13,21,22] Other conditions, such as terminal dementia were associated with general mortality, but in-hospital death was not specifically examined.[19] One study reported that patients who received palliative care consultations in the ICU had higher mortality rates than those who did not receive these consultations, but another recent study found palliative care did not change mortality rates for ICU patients.[14,23] One study examined hospital mortality rates by individual medical ICU patient characteristics, including total hospital stay >10 days, age 80 years and older with 2 or more co-morbidities, stage IV cancer, status post cardiac arrest, intracerebral hemorrhage with mechanical ventilation, but did not compare likelihood of in-hospital death by other characteristics or compare the strengths of associations of the individual characteristics.[13] Thus, while triggers for ICU palliative care consultation have been developed based on hospital mortality rates for individual conditions,[11,13,19,20] more observational studies are needed to examine predictors of mortality for general medical ICU patients receiving palliative care consultations.

This palliative care population in the ICU had a median LOS of 12 days, compared to several large ICU studies not focused on palliative care, which reported median LOSs between 16.4 to 24.5 days for ICU patients receiving usual care.[11,13,24] LOS has been suggested as an important trigger for palliative care

consultation among ICU patients.[10,20] Other triggers suggested for palliative care consultation for ICU patients have included age >80 years, more than 5 days on a ventilator, more than 7 days in the ICU, and "problematic cases" identified by the ICU clinical staff.[10] The IPAL-ICU (Improving Palliative Care in the ICU) Project is using the following triggers for palliative care intervention in the ICU: pre-existing functional dependence, age>80 years, advanced-stage malignancy, global cerebral ischemia after cardiac arrest, prolonged multi-organ failure, ICU LOS, referral for tracheotomy or gastrostomy, or patient/family's decision to forego life-sustaining therapy such as hemodialysis for renal failure.[20] Norton's study found that patients with a pre-ICU admission hospital LOS of >10 days had a 54% in-hospital mortality rate, but mortality rate of patients with shorter lengths of stays were not reported.[13]

Decision-making is perceived by patients and families to be a key feature of palliative care in an acute hospital setting,[25] yet families also report feeling unprepared for inpatient palliative care consultation and for discussing prognosis.[26] The uncertainty of primary team providers in academic hospital environments has been identified as a barrier to quality end-of-life care in hospitals,[27] and the complexity and emotional labor involved in prognostication by hospital specialist palliative medicine teams has been recognized.[28] Previous research has identified the need to examine outcomes of different levels of palliative care consultation, comparing more intensive interventions versus those with lower levels of contact with patients.[29] We feel that the most intense palliative care consultations are for patients and families who need assistance in determining an achievable POC. More intense POC consultations have been associated with increased code status changes and referrals to hospice among hospital patients with cancer,[30] and have been associated with in-hospital death among elderly non-ICU medical patients.[16] In a previous study, many patients admitted to an academic hospital ICU did not have informed discussions on end-of-life or palliative care before ICU admission.[31] Although basic palliative care is often provided by intensivists or attending physicians, our findings indicate that many ICU patients close to death require intensive palliative care interventions. These intensive interventions include coordination of care among multiple specialists and family meetings for family members struggling to cope with tragic situations, uncertain prognosis and needing assistance in developing an achievable POC. These time-intensive interventions may be best served by palliative care specialists.[32] The high risk of in-hospital mortality for ICU patients makes it critical to identify triggers for palliative care consultation earlier during the ICU stay, to alleviate family and patient suffering and promote patient-centered plans of care.[32,33]

In our study, 43% of the study sample of ICU patients receiving palliative care consultations were of Asian ethnicity. Unlike previous studies of general hospitalized patients,[34,35] ethnicity was not significantly associated with likelihood of in-hospital death in this study, after adjusting for LOS. Hawaiian, Pacific Islander and Micronesian ethnicities, reported to have higher rates of late-stage presentation of illness,[36] were associated with

increased likelihood of in-hospital death on univariate analysis, but not in the final model.

Cancer diagnoses were associated with increased likelihood of in-hospital death in models that did not include POC. In one previous study, shortness of breath and hematological cancer were associated with higher in-hospital mortality among patients in the acute palliative care unit of a comprehensive cancer center.[37] Another study identified admission from another oncology floor, hypernatremia or hyponatremia, and supplemental oxygen use as additional risk factors for in-hospital mortality.[38]

In our study, Karnofsky score was not associated with risk of in-hospital death among ICU patients receiving palliative care consultation. This is in contrast to a previous study of patients with advanced cancer, which reported that a Palliative Prognostic Index of more than 6 was associated with a significantly higher risk for in-hospital death.[39] In our study, all the patients' Karnofsky scores were very low, regardless of in-hospital death outcome, allowing too little variation for significance on analyses.

Strengths and Limitations

This study has several strengths. Data on all the patients who received PPC consultations (almost 5,000 consultations in 5 years) were prospectively collected by the PPC Department since the opening of this service. The patient population included both cancer and non-cancer patients, and was representative of a general hospital in-patient population.

There are several limitations to this study that should be acknowledged. The wide confidence intervals reflect the relatively small number of patients in these analyses as we focused on only ICU patients who had non-surgical diagnoses to avoid including healthier, non-palliative, acute post-surgical pain patients. Data on the indication for the ICU admission were not available, although the palliative care team recorded the diagnosis most likely to be underlying the need for the consultation. Additional information on severity of illness such as Acute Physiology and chronic Health Evaluation (APACHE) scores, tracheostomy status or other factors was not available. This study was conducted in a hospital setting with the longest standing and most experienced PPC team in the state. However, based on our findings, we suspect that needing help with plan of care and being in the ICU for more than seven days is a powerful predictor of in-hospital mortality in most hospitals.

The findings of this study have important implications for research and practice. The two strongest predictors of in-hospital death for ICU patients in this study, long pre-consultation hospital stay and requiring assistance with POC, should be further examined in research to use as a trigger for proactive palliative care consultation in the ICU. The findings about intensive consultations for assistance with POC can also be used by palliative care teams starting new ICU services. Discussions with hospital administrators regarding staffing and time commitment required to provide palliative care to ICU patients need to consider that the patients at highest risk of in-hospital death require the most intense (in terms of time and effort) palliative care consultations. With adequate support, proactive efforts to initiate palliative care interventions for patients and their families can be smoothly implemented.[11,13] Further studies are needed to examine if proactive palliative care intervention in the ICU will effectively reduce in-hospital death and improve quality of life for ICU patients.

Conclusion

High pre-consultation LOS and consultations for assistance with POC were associated with increased likelihood of in-hospital death among ICU patients receiving palliative care consultation. Further research is needed to determine if earlier intense palliative care consultations for assistance with POC in the ICU may reduce the likelihood of in-hospital death.

Conflict of Interest

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