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## Utilization and Delivery of Specialty Palliative Care in the ICU: Insights from the Palliative Care Quality Network

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### Abstract

**Context.**—Palliative care (PC) benefits critically ill patients but remains underutilized. Important to developing interventions to overcome barriers to PC in the ICU and address PC needs of ICU patients is to understand how, when, and for which patients PC is provided in the ICU.

**Objectives.**—Compare characteristics of specialty PC consultations in the ICU to those on medical-surgical wards.

**Methods.**—Retrospective analysis of national Palliative Care Quality Network data for hospitalized patients receiving specialty PC consultation January 1, 2013 to December 31, 2019 in ICU or medical-surgical setting. 98 inpatient PC teams in 16 states contributed data. Measures and outcomes included patient characteristics, consultation features, process metrics and patient outcomes. Mixed effects multivariable logistic regression was used to compare ICU and medical-surgical units.

**Results.**—Of 102,597 patients 63,082 were in medical-surgical units and 39,515 ICU. ICU patients were younger and more likely to have non-cancer diagnoses (all  $P < 0.001$ ). While fewer ICU patients were able to report symptoms, most patients in both groups reported improved symptoms. ICU patients were more likely to have consultation requests for GOC, comfort care,

and withdrawal of interventions and less likely for pain and/or symptoms (OR-all  $P < 0.001$ ). ICU patients were less often discharged alive.

**Conclusion.**—ICU patients receiving PC consultation are more likely to have non-cancer diagnoses and less likely able to communicate. Although symptom management and GOC are standard parts of ICU care, specialty PC in the ICU is often engaged for these issues and results in improved symptoms, suggesting routine interventions and consultation targeting these needs could improve care.

### Keywords

Critical care; palliative medicine; PCQN

## Introduction

Palliative care (PC) is an interprofessional specialty focused on improving the quality of life (QOL) and care for seriously ill patients and their families, regardless of their disease trajectory.<sup>1</sup> In the intensive care unit (ICU), many PC needs are apparent including: communication of prognosis and diagnosis; complex patient, family and surrogate interactions; difficult decision making and goals-of-care (GOC) conversations; complex symptom management; and end-of-life (EOL) care often involving withdrawal of interventions.<sup>2,3</sup> Despite estimates that a large subset of ICU patients would benefit from PC consultation,<sup>4</sup> specialty PC remains underutilized in the ICU setting overall<sup>5</sup> and for the subset of patients who die in the ICU.<sup>6</sup>

PC interventions in the critically ill have been associated with reduced subsequent ICU admissions and reduced ICU length of stay.<sup>7</sup> Barriers to PC integration and utilization in the ICU include unrealistic expectations of ICU interventions by patients and families, barriers related to ICU culture as well as cultural attributes of patients and families, insufficient training in PC principles for ICU clinicians, PC workforce shortages, and inability of patients to participate in treatment discussions.<sup>8,9</sup> Overcoming these barriers and assessing patient and provider needs for specialty PC depends on the availability and capabilities of PC services at the institutional level, the bandwidth of providers and characteristics of the patient population. While patients from medical-surgical units and those in the ICU setting are distinct populations with differing presentations, acuity, and likely prognosis, comparison of PC delivery in these different populations including reasons for consultation and issues addressed by the PC team can help guide PC resource allocation and PC education needs for providers. Hence, an important step in developing interventions to overcome these barriers and address PC needs for ICU patients is to better understand how, when, and for which patients PC is currently provided in the ICU and how it compares to medical-surgical units.

Palliative Care in the ICU cannot be discussed without highlighting the groundbreaking research of Dr. J. Randall Curtis, MD. His body of work has not only taught us the state of palliative care provision in the ICU, but also what skills are needed to provide quality care. Dr. Curtis and colleagues demonstrated early on the challenges with goals of care conversations and family meetings in the ICU. Subsequently he developed tools to teach

these skills and evaluated their effectiveness. Dr. Curtis' work also helped to measure quality of care and quality of communication in end-of-life care identifying factors that contribute to quality and allowing others to assess interventions to improve care.<sup>10–15</sup> His focus on the patient and family and improving care for the critically ill provided the foundation for integration and evaluation of PC in the ICU as well as a road-map for future research in this space. Through his large body of research that made the case for the importance, relevance, and need for palliative care in the ICU, Dr. Curtis also paved the way for clinicians interested not just in research but also clinical practice and education at this intersection. In fact, three authors of this work (ACC, JAL, and JC) have careers made possible through the pioneering work of Dr. Curtis. We cite his groundbreaking research throughout this paper in gratitude and admiration of his work and because they are essential to understanding and improving palliative care in the ICU.

## Methods

### Study Population

The PCQN is a national quality improvement collaborative of specialty PC teams that collect standardized data on processes of care and patient-level outcomes.<sup>16</sup> As of December 2019, there were 98 inpatient PC teams in the PCQN from hospitals across 16 states. Teams in the PCQN vary in composition and work in a broad range of hospitals (Table 1).

Patients who received a PC consultation between January 1, 2013 and December 31, 2019 in the ICU or medical-surgical setting were included. Though patients in medical-surgical units differ from those in the ICU, we chose them as a comparator because they represent a large cohort of patients seen by PC teams. While medical-surgical patients have a similar breadth of diagnoses, patient characteristics, and access to PC consultation resources, their PC needs likely differ. This comparison helps elucidate the differences in reasons for PC consultation and issues addressed by PC teams that could guide PC team processes, operations, and resource allocation tailored to each setting.

### Dataset

The PCQN dataset has been previously described in detail.<sup>16</sup> PCQN teams prospectively collect a standardized set of 23 data elements in real time capturing patient characteristics, processes and outcomes data for all patients seen by a specialty PC team. Patient characteristics at time of referral include age, gender, and referral location. Processes of care metrics include date of PC consultation, number of family meetings, number of PC team assessments, and reason(s) for consultation for which the team can record as many as are appropriate. Initial PC team assessment of advance care planning (ACP) includes surrogate decision-maker designation, code status, and presence in the electronic health record of a Physician's Orders for Life-Sustaining Treatment (POLST)<sup>17</sup> form and/or an advance directive (AD). Teams also collect patient-reported outcomes including Palliative Performance Scale (PPS), a 0%–100% measure of functional status, with higher scores reflecting greater function at the first visit and symptom severity at each visit with the patient (pain, dyspnea, nausea, and anxiety rated none, mild, moderate, and severe, and patient unable to rate).<sup>18</sup> Treatment outcomes include code status after consultation

(Full Code, Do-not-resuscitate and/or Do-not-intubate (DNR/DNI), or Partial code), ACP documentation completed, discharge disposition, discharge location, and services provided. The study was reviewed and approved by the University of California, San Francisco Institutional Review Board (16-18596).

### Statistical Analysis

Continuous variables were summarized using means (95% confidence intervals [CI]) medians (with range). Frequencies were calculated for categorical variables. We used chi-squared tests ( $\chi^2$ ) to examine bivariate associations between categorical variables and analysis of variance (ANOVA) to examine associations between categorical and continuous variables. Change in reported symptom scores from initial assessment to second assessment and to last assessment were calculated with a change of one category ( $\pm 1$ ) considered clinically meaningful.<sup>19–21</sup> We used mixed effects multivariable logistic regression models to study the association of ICU vs. medical-surgical units with both processes of care and treatment outcomes. For each of the binary outcomes we examined, we included age, gender, and primary diagnosis as fixed effects and PC team as a random effect to account for intra-team correlation of patient measures. For each of the outcome models, we report the OR and 95% CI for the primary predictor (ICU vs. Medical-surgical).

There was no adjustment or imputation for missing covariate or outcome values. Analyses were performed only for patients for whom both covariate and specific outcome data were available, resulting in different *n* values for each analysis. We used a 2 sided alpha of 0.01. We used SPSS, version 27 for MAC (SPSS Inc).

## Results

### Patient Characteristics

A total of 102,597 patients were seen and evaluated by a PC team; 39% (*n* = 39,515) received a PC consult in the ICU and 61% (*n* = 63,082) in a medical-surgical unit. ICU patients referred to PC were younger 68.43 vs. 72.04, *P* < 0.0001, less likely to be female (45.4% vs. 52.0%, *P* < 0.0001), more likely to have a primary diagnosis other than cancer (cancer diagnosis 15.0% vs. 40.9%, *P* < 0.0001) and had poorer functional status (PPS 25.7; 95%CI: 25.5, 25.9 vs. 41.6; 95%CI: 41.5, 41.8, *P* < 0.0001) (Table 2). PC referrals from the ICU were more likely to be for GOC and ACP and less likely to be for pain or other symptom management (80.6% vs. 75.0% for goals of care and/or ACP and 6.1% vs. 21.8% for pain management, *P* < 0.0001). ICU patients were significantly less likely to have a POLST (7.7% vs. 13.5%, *P* < 0.0001) or advance directive (19.1% vs. 25.4%, *P* < 0.0001, and were significantly more likely to have full or partial code (for example: DNR but intubation within goals) status (71.1% vs. 58.2%, *P* < 0.0001). The time from admission to consultation request was longer for ICU patients. Overall, 38.1% (*n* = 39,090) of patients received a referral request for PC within 24 hours of admission, with medical-surgical patients more likely to have a referral in this timeframe than ICU patients (39.5%; *n* = 25,075 vs. 35.5%, *n* = 14,015; *P* = 0.0001).

Patients referred from the ICU were less likely to be able to report pain, anxiety, nausea, and dyspnea at time of PC consultation than their medical-surgical counterparts. Of those able to report, ICU patients were less likely to have moderate and/or severe pain and nausea and more likely to have moderate and/or severe dyspnea. There were no differences between the 2 patient populations in prevalence of anxiety.

After adjusting for confounders, ICU patients had higher adjusted odds ratios (OR) of consultation requests for GOC/ACP (OR = 1.70, 95%CI: 1.64, 1.77), comfort care (OR = 1.82, 95%CI: 1.72, 1.92), withdrawal of interventions (OR = 6.47, 95%CI: 5.91, 7.08), and patient or family support (OR = 1.56, 95%CI: 1.51, 1.62;  $P < 0.001$ ) (Table 3). Consistent with the lower reported symptom burden in ICU patients referred to PC, they were significantly less likely than medical-surgical patients to receive consultation for pain (OR = 0.26, 95%CI: 0.24, 0.27;  $P < 0.001$ ) or other symptoms (OR = 0.57, 95%CI: 0.54, 0.60;  $P < 0.001$ ).

### Treatment Outcomes

Patients referred from ICU were more likely to receive their second visit within 72 hours of their first (11.6% vs. 6.8%.  $P < 0.001$ ) (Tables 4 and 5). The vast majority of patients in both groups reported improvements in symptoms by the second PC visit and those in the ICU were more likely to report improvements in pain (72.9% vs. 67.0%,  $P < 0.001$ ) and nausea (83.0% vs. 76.6%,  $P < 0.05$ ). Although ICU consultations were more likely for ACP and GOC, POLSTs and ADs were significantly less likely to be completed in the ICU. Specialty PC teams held more family meetings for ICU patients and both groups had high rates of surrogate decision-maker designation.

In both cohorts, nearly two-thirds of patients had a code status of DNR/DNI after PC consultation (Table 4). ICU patients referred to PC were significantly less likely to be discharged alive compared to those on medical-surgical units, and of those discharged, ICU patients were less likely to be discharged to home. Hospice was provided at discharge in about one third of cases in both cohorts. Non-hospice outpatient PC services were infrequently provided in both groups.

### Discussion

Using a large, national, prospectively collected database of PC consultation characteristics and outcomes, we found that the vast majority of ICU referrals for PC were for ACP and GOC in contrast to a more diverse utilization of PC consultation in medical-surgical patients. While ICU patients were sicker and more likely to die before discharge, their PC consultations were requested on average one day later in the hospitalization. Our findings describe the current state of PC delivery in the ICU and what PC specialists are being asked to do, highlighting the differing needs of patients and teams from these two settings.

Our results reveal a high prevalence of unmet PC needs in ICU patients. Even though 40% of ICU patients were able to report symptoms, compared to 70% of medical-surgical patients, and a significant percentage reported moderate-severe symptoms, specialty PC was rarely sought for pain and symptom management (6% and 9%, respectively). Similar to

other studies, we found that ICU patients report the presence of symptoms such as pain and dyspnea<sup>22–24</sup> and that PC team involvement was associated with improvements in pain (73%) and dyspnea (63%) though given the observational design of all of these studies, we cannot infer causality.<sup>25–27</sup> Given that symptom control is correlated with quality of life at the end of life,<sup>13</sup> our results demonstrate the need for improved symptom identification and treatment and a potential role for specialty PC in symptom management.

We found that most ICU patients have a Full Code status at time of consultation and that withdrawal of interventions is a common reason for consultation, suggesting specialty PC in the ICU is commonly utilized when more invasive strategies are not working. This idea of a ‘time-limited trial’ of ICU care<sup>28</sup> and the ‘culture of rescue’ by which aggressive care is employed to save patients, is also supported by the longer length of stay prior to PC consultation in the ICU and may delay PC involvement.<sup>29,30</sup> PC consultations may represent a means to de-escalate care during new or severe exacerbations of serious illness, as Ma and colleagues described, with early PC consultation associated with de-escalation of care and increased utilization of hospice.<sup>31</sup> That these consultations happen on average six days into hospitalization and nearly a full day later than for patients in medical-surgical units, suggests an opportunity to engage patients in GOC conversations sooner, potentially allowing more patients to participate in these discussions. Prior research has found that among patients who die in the hospital, the families of those cared for in the ICU reported higher rating of quality care at the end of life than those cared for on the wards<sup>32</sup> and our results suggest that earlier or routine involvement of specialty PC teams with ICU patients may further improve quality of care. We found that PC teams consulting in the ICU were more likely to follow up within 72 hours, had more family meetings on average, and also reported support for families and symptom management, suggesting that they provided a longitudinal, comprehensive, specialty PC consultation in the ICU that includes and extends beyond GOC.

In addition to specialty PC consultation, other approaches to PC delivery have been described, including by ICU teams such as focusing on the family conference as a means to improve communication between teams and families at the EOL<sup>33,34</sup> and a communication facilitator intervention developed by Dr. J. Randall Curtis, MD and his team showing reduced costs, length of stay, and intensity of EOL care.<sup>35</sup> Other ICU based interventions including an ICU led Family Support intervention resulted in improvements in quality of communication and reduction in length of stay.<sup>36</sup> Many ICU clinicians express that PC may be within their own knowledge domain<sup>37</sup> and as a result, may be less inclined to consult PC. The dual roles of primary and specialty palliative care in the care of critically ill patients is evident and challenging to quantify and has been an ongoing topic of evaluation for Dr. Curtis and the Cambia Palliative Care Center for Excellence. Unfortunately, the PCQN dataset does not capture primary PC delivery and we agree that documenting this care is a target of future research to better understand the overall delivery of PC in and out of the ICU. The fact that unmet PC needs are identified and that specialty PC consultation impacts symptom and care planning outcomes, suggests that there remain important gaps in PC delivery in the ICU. Triggers for PC consultation could help engage PC teams earlier and more routinely in an ICU stay, though novel trigger development is necessary to improve sensitivity of these tools.<sup>38</sup>



Patients in the ICU were less likely to have a POLST or AD documented. A POLST or similar document is often used to limit interventions, not to express preferences for full treatment, and thus the lower incidence was expected in the ICU. Of note, Lee et al. found that while having a treatment limiting POLST was associated with a lower rate of admission to the ICU in the last six months of life when compared to patients with full treatment POLSTs, they also highlight that 38% of patients with treatment limiting POLSTs received intensive care that may have been discordant with their POLST.<sup>39</sup> The lack of ACP documents among patients in the ICU may suggest unanticipated serious illness, highlighted by the lower likelihood of cancer being the primary diagnosis. However, acute exacerbations necessitating ICU admission for people with heart and lung disease, among other illnesses, are common and can be anticipated.<sup>40</sup> These findings highlight an opportunity for PC consultation and ACP earlier in the disease trajectory and for a broader range of diagnoses.

There are limitations in this study. First, given the variables gathered and retrospective nature of the study, there may be unmeasured confounding, including different ICU types and characteristics of referring providers. Additionally, we use registry data collected by clinicians during routine practice, and while this allowed for a large sample reflective of actual practice, to feasibly collect this data, the PCQN is intentionally focused and collection is not always complete for each data element. Separately, there may be biases related to local practices and referral patterns by PC teams and referring providers in each institution and setting.<sup>41</sup> The inclusion of a large number of teams from many different institutions and controlling for patient clustering by PC team in our analyses mitigates this issue. Other factors known to influence PC consultations in the ICU, such as provider training, knowledge, and available PC staffing and models, could not be controlled for. The PCQN database does not provide data on prior hospitalizations or link to PC in the outpatient setting, which limits our understanding of previous ACP, changes in goals over time, and resources available to patients prior to admission. Finally, while we would also like to compare patients in the ICU that received PC consultation to patients who did not, the PCQN dataset includes data only on patients seen by PC teams. Nonetheless, these data provide a detailed picture of the current state of PC consultation across a wide range of institutions in the US.

In summary, our study highlights that patients receiving PC consultation in the ICU are sicker, more likely to die, and less likely to be able to communicate than those on medical surgical units. The majority of PC consults in the ICU are for GOC and ACP support though specialty PC teams also improve pain and dyspnea. PC teams provide longitudinal care and address a broad range of PC needs for ICU patients. Routine involvement of PC for patients with serious life-limiting conditions on admission to the ICU could allow more patients to participate in GOC conversations, earlier implementation of care decisions, and more effective management of symptoms. Rigorous follow up evaluation of these approaches, including patient, family and clinician perspectives on patient centered outcomes and goal-concordant care initiatives,<sup>42</sup> as well as iteration of the optimal balance of primary and specialty PC interventions in the ICU based on these data could further improve care.<sup>43,44</sup>



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**Table 1**

Characteristics of Hospitals and Palliative Care Teams Contributing Data to the PCQN Dataset.

Characteristics	Frequency % ( <i>n</i> )
State:	<i>N</i> = 98
California	59.0 (58)
Arizona	4.1 (4)
Hawaii	1.0 (1)
Kentucky	2.0 (2)
Louisiana	4.1 (4)
Massachusetts	3.1 (3)
Michigan	5.1 (5)
Missouri	1.0 (1)
Montana	1.0 (1)
New Mexico	1.0 (1)
Oregon	4.1 (4)
South Carolina	1.0 (1)
Texas	8.2 (8)
Washington	4.1 (4)
Wisconsin	1.0 (1)
Size:	<i>N</i> = 73
Mean	348
Median	286
Range:	26 – 1,120
	<i>N</i> = 73
1 – 149 beds	10 (13.7)
150 – 299 beds	27 (37.0)
300 – 499 beds	19 (26.0)
500+ beds	17 (23.3)
Hospital Status	<i>N</i> = 97
Not for profit	68.1 (66)
Academic	17.5 (17)
Public	11.3 (11)
For profit	1.0 (1)
Other	2.1 (2)
Team composition <sup>a</sup> :	% ( <i>n</i> )
Nurse (NP/RN)	92.2 (83/90)
Physician	98.8 (84/85)
Social Worker	87.1 (74/85)
Chaplain	69.9 (58/83)
Number of members in the team:	<i>N</i> = 90
1	3.3 (3)
2	12.2 (11)

Characteristics	Frequency % (n)
3	33.3 (30)
4	51.1 (46)
Credentialed <sup>b</sup> :	
Registered Nurse	44.3 (27/61)
Nurse Practitioner	57.7 (41/71)
Physician	94.7 (72/76)
Social Worker	33.3 (21/63)
Chaplain	18.6 (11/59)

<sup>a</sup>Percentage of teams with each discipline.

<sup>b</sup>Credentialling includes American Board of Hospice and Palliative Nursing certification for nurses, American Board of Medical Specialties certification for physicians; Advanced Palliative Hospice and Social Work Certification credentialling for Social Workers and Palliative Care & Hospice Advanced Certification or Hospice and Palliative Care Specialty Certification credentialling for Chaplains.

Table 2

Patient Characteristics at Time of Palliative Care Consultation.

Patient Characteristics	Referral Location		P-value
	ICU	Med/Surg	
Age (Years)			
Median (SD)			
	<i>N</i> = 39,462	<i>N</i> = 63,056	
	<i>Mean (95%CI)</i>	<i>Mean (95%CI)</i>	
	68.43 (68.27,68.59)	72.04 (71.91,72.17)	<0.001
	<i>70.0 (16.0)</i>	<i>74.0 (16.3)</i>	
	<i>%(n)</i>	<i>%(n)</i>	
	<i>N</i> = 39,501	<i>N</i> = 63,047	
Gender (Female)	45.4 (17.919)	52.0 (32.815)	<0.001
Primary Diagnosis:	<i>N</i> = 38,750	<i>N</i> = 62,012	
Cancer	15.0 (5,819)	40.9 (25,355)	<0.001
Cardiovascular	20.3 (7,864)	7.2 (4,483)	
Pulmonary	16.5 (6,405)	7.2 (4,439)	
Neurologic/Stroke	15.9 (6,146)	7.6 (4,713)	
Other	32.3 (12,516)	37.1 (23,022)	
Reason for referral:	<i>N</i> = 39,012	<i>N</i> = 62,590	
GoC/ACP	80.6 (31,434)	75.0 (46,913)	<0.001
Pain management	6.1 (2,393)	21.8 (13,665)	<0.001
Other symptom management	9.0 (3,500)	15.1 (9,472)	<0.001
Hospice referral/discussion	9.8 (3,806)	17.7 (11,059)	<0.001
Comfort care	9.7 (3,780)	5.1 (3,172)	<0.001
Withdrawal of interventions	7.7 (3,014)	1.3 (787)	<0.001
Support for patient/family	36.6 (14,271)	25.9 (16,189)	<0.001
	<i>N</i> = 34,321	<i>N</i> = 54,558	
	<i>Mean (95%CI)</i>	<i>Mean (95%CI)</i>	
PPS score	25.7 (25.5,25.9)	41.6 (41.5,41.8)	<0.001
Median (SD)	20.0 (17.5)	40.0 (18.3)	
	<i>%(n)</i>	<i>%(n)</i>	
Code Status:	<i>N</i> = 38,366	<i>N</i> = 61,543	

Patient Characteristics	Referral Location		P-value
	ICU	Med/Surg	
Full	64.4 (24,720)	55.9 (34,402)	<0.0001
Partial	6.7 (2,564)	2.3 (1,441)	
DNR/DNI	28.9 (11,082)	41.8 (25,700)	
	<i>N</i> = 39,496	<i>N</i> = 63,025	
Time between admission and PC consult in days	<i>Mean (95%CI)</i>	<i>Mean (95%CI)</i>	<0.001
	5.90 (5.73,6.07)	5.04 (4.87,5.20)	
	<i>Median (SD)</i>	<i>Median (SD)</i>	
	3.0 (17.1)	2.0 (20.9)	
	% ( <i>n</i> )	% ( <i>n</i> )	
	<i>N</i> = 39,496	<i>N</i> = 63,025	
PC referral within 24 hours of admission:	35.5 (14,015)	39.8 (25,075)	<0.001
Symptoms at time of consult:			
Pain:			
Able to report	<i>N</i> = 32,762	<i>N</i> = 53,209	<0.001
	42.8 (14,048)	73.8 (39,266)	
	<i>N</i> = 14,048	<i>N</i> = 39,266	
Severity – Mod./Severe <sup>a</sup>	18.0 (2,527)	31.5 (12,364)	<0.001
Anxiety:			
Able to report	<i>N</i> = 32,666	<i>N</i> = 53,049	
	40.0 (13,066)	68.5 (36,342)	<0.001
	<i>N</i> = 13,066	<i>N</i> = 36,342	
Severity – Mod./Severe <sup>a</sup>	11.8 (1,537)	11.6 (4,214)	
Nausea:			0.61
Able to report	<i>N</i> = 32,692	<i>N</i> = 53,059	
	41.2 (13,465)	72.0 (38,215)	
	<i>N</i> = 13,465	<i>N</i> = 38,215	<0.001
Severity – Mod./Severe <sup>a</sup>	2.3 (310)	5.7 (2,185)	
Dyspnea:			
Able to report	<i>N</i> = 32,685	<i>N</i> = 52,951	<0.001
	41.5 (13,571)	72.4 (38,335)	
	<i>N</i> = 13,571	<i>N</i> = 38,335	
Severity – Mod./Severe <sup>a</sup>	16.8 (2,276)	7.8 (3,002)	<0.001

<sup>a</sup>Of patients that were able to report symptoms.



Abbreviations: ICU = intensive care unit; CI = confidence interval; PC = palliative care; PPS = palliative performance scale; GoC = goals of care; ACP = advance care planning; SD = standard deviation.

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**Table 3**

Multivariate Regression of Processes of Care for Patients Referred for PC from ICU vs. Medical/Surgical Units with Medical/Surgical Unit Patients as the Reference Group.

Processes of Care	OR 95%CI <sup>a</sup>	P-value
Reason for referral	N = 64,682	
GoC/ACP	1.70 (1.64,1.77)	<0.001
Pain management	0.26 (0.24,0.27)	<0.001
Other symptom management	0.57 (0.54,0.60)	<0.001
Hospice referral/discussion	0.59 (0.56,0.61)	<0.001
Comfort care	1.82 (1.72,1.92)	<0.001
Withdrawal of interventions	6.47 (5.91,7.08)	<0.001
Support for patient/family	1.56 (1.51,1.62)	<0.001
	N = 61,528	
POLST at time of consult	0.66 (0.62,0.69)	<0.001
	N = 62,599	
Advance Directives documented at time of consult	0.87 (0.84,0.91)	<0.001
Code status at time of consult:	N = 63,932	
Full	1.0	
Partial	3.01 (2.79,3.25)	<0.001
DNR/DNI	0.71 (0.69,0.74)	<0.001
	N = 65,121	
PC referral within 24 hours of admission:	0.88 (0.84, 0.91)	<0.001
PPS by tertile		
	N = 57,050	
70% – 100%	1.0	
40% – 60%	2.02 (1.87,2.19)	<0.001
10% – 30%	8.90 (8.20,9.65)	<0.001
Symptoms at time of consult		
Pain:	N = 55,586	
Able to report	0.27 (0.26,0.28)	<0.001
	N = 35,962	
Severity – Mod./Severe <sup>b</sup>	0.53 (0.50,0.56)	<0.001
Anxiety:	N = 55,378	
Able to report	0.29 (0.28,0.30)	<0.001
	N = 33,399	
Severity – Mod./Severe <sup>b</sup>	0.96 (0.89,1.03)	0.26
Nausea:	N = 55,425	
Able to report	0.27 (0.25,0.28)	<0.001
	N = 34,968	
Severity – Mod./Severe <sup>b</sup>	0.53 (0.47,0.61)	<0.001
Dyspnea:	N = 55,370	

Processes of Care	OR 95%CI <sup>a</sup>	P-value
Able to report	0.27 (0.26,0.28) N = 35,085	<0.001
Severity – Mod./Severe <sup>b</sup>	1.98 (1.85,2.13)	<0.001

<sup>a</sup> All mixed effect multivariate logistic regression models include PC team clustering as a random effect, and age, gender, and primary diagnosis as fixed effects.

<sup>b</sup> Of patients that were able to report symptoms.

Abbreviations: PC = palliative care; ICU = intensive care unit; OR = odds ratio; GoC = goals of care; ACP = advance care planning; POLST = Physician Order for Life-Sustaining Treatments; DNR = do-not-resuscitate; DNI = do-not-intubate; PPS = Palliative Performance Scale; Mod = moderate.

**Table 4**

Treatment Outcomes of Medical-Surgical and ICU Patients Referred to Palliative Care.

Treatment Outcomes	Referral Location		P-value
	ICU	Med/Surg	
	<i>% (n)</i>	<i>% (n)</i>	
	<i>N = 19,588</i>	<i>N = 31,203</i>	
2nd PC assessment within 72 hours after 1st assessment	11.6 (2,268)	6.8 (2,136)	<0.001
Symptom improvement from 1st to 2nd assessment <sup>a</sup>	<i>N = 1,634</i>	<i>N = 9,086</i>	
Pain	72.9 (1,191)	67.0 (6,087)	<0.001
	<i>N = 947</i>	<i>N = 2,812</i>	
Anxiety	72.3 (685)	69.3 (1,949)	0.08
	<i>N = 182</i>	<i>N = 1,624</i>	
Nausea	83.0 (151)	76.6 (1,244)	0.05
	<i>N = 1,312</i>	<i>N = 1,831</i>	
Dyspnea	63.4 (832)	64.7 (1,184)	0.47
	<i>N = 36,266</i>	<i>N = 58,027</i>	
	<i>Mean (95% CI)</i>	<i>Mean (95% CI)</i>	
Mean number of family meetings	1.67 (1.65, 1.68)	1.23 (1.22, 1.24)	<0.001
Median (SD)	1.0 (1.6)	1.0 (1.3)	
	<i>% (n)</i>	<i>% (n)</i>	
Surrogate decision maker at time of discharge:	<i>N = 24,420</i>	<i>N = 40,290</i>	
Not Identified	3.7 (907)	4.9 (1,994)	<0.001
Identified	92.0 (22,471)	88.0 (35,456)	
Not Addressed	4.3 (1,042)	7.0 (2,840)	
Code status at discharge:	<i>N = 27,293</i>	<i>N = 42,821</i>	
Full	30.5 (8,336)	32.8 (14,050)	<0.001
Partial	5.6 (1,517)	2.1 (886)	
DNR/DNI	63.9 (17,440)	65.1 (27,885)	
	<i>N = 35,452</i>	<i>N = 56,087</i>	
POLST Completed during PC consultation	8.5 (3,002)	16.9 (9,487)	<0.001
	<i>N = 35,665</i>	<i>N = 56,545</i>	
Advanced directives completed during PC consultation	3.4 (1,199)	4.3 (2,454)	<0.001
	<i>N = 38,919</i>	<i>N = 61,904</i>	
	<i>Mean (95% CI)</i>	<i>Mean (95% CI)</i>	
Mean days followed by the PC Team	6.85 (6.70–7.01)	5.57 (5.40–5.74)	<0.001
Median (SD)	4.0 (15.7)	3.0 (21.1)	
	<i>% (n)</i>	<i>% (n)</i>	
Discharge Disposition:	<i>N = 39,001</i>	<i>N = 62,355</i>	
Discharged alive	56.7 (22,112)	87.1 (54,283)	<0.001
Discharge Location:	<i>N = 21,728</i>	<i>N = 53,468</i>	
Home	31.2 (6,774)	49.5 (26,471)	<0.001
Inpatient	34.6 (7,524)	17.8 (9,516)	

Treatment Outcomes	Referral Location		P-value
	ICU	Med/Surg	
Non-Hospital Facility	29.4 (6,387)	29.5 (15,791)	
Other	4.8 (1,043)	3.2 (1,690)	
Service provided if discharged:	<i>N</i> = 19,009	<i>N</i> = 49,124	
None	44.2 (8,395)	34.1 (16,764)	<0.001
	<i>N</i> = 19,004	<i>N</i> = 49,075	
Nursing Home	12.2 (2,315)	15.8 (7,755)	<0.001
	<i>N</i> = 18,995	<i>N</i> = 49,061	
Clinic-based PC	1.4 (274)	6.0 (2,930)	<0.001
	<i>N</i> = 18,995	<i>N</i> = 49,061	
Home-based PC	3.1 (588)	6.7 (3,270)	<0.001
	<i>N</i> = 19,009	<i>N</i> = 49,124	
Hospice	31.6 (5,998)	35.3 (17,355)	<0.001

<sup>a</sup>Of patients reporting moderate to severe symptom distress at initial assessment.

Abbreviations: PC = palliative care; ICU = intensive care unit; GoC = goals of care; ACP = advance care planning; POLST = Physician Order for Life-Sustaining Treatments; DNR = do-not-resuscitate; DNI = do-not-intubate; PPS = Palliative Performance Scale; Mod = moderate.

**Table 5**

Multivariate Regression of Palliative Care Treatment Outcomes for ICU Patients Compared to Medical-Surgical Patients With Medical/Surgical Patients as the Reference Group.

Treatment Outcomes	OR (95%CI) <sup>a</sup>	P-value
	N = 33,880	
Patients receiving 2nd PC assessment 72 hours after 1st assessment	1.62 (1.51,1.75)	<0.001
Symptom improvement from 1st to 2nd assessment <sup>b</sup>	N = 7,818	
Pain	1.13 (0.99,1.30)	0.06
	N = 2,784	
Anxiety	1.11 (0.91,1.35)	0.32
	N = 1,468	
Nausea	1.37 (0.86,2.17)	0.19
	N = 2,638	
Dyspnea	0.96 (0.81, 1.14)	0.68
Surrogate decision maker at time of discharge:	N = 41,614	
Not Identified	1.0	
Identified	1.35 (1.23,1.48)	<0.001
Not Addressed	0.79 (0.70,0.89)	<0.001
Code status at discharge:	N = 44,932	
Full	1.0	
Partial	3.62 (3.27,4.01)	<0.001
DNR/DNI	1.44 (1.38,1.50)	<0.001
	N = 58,777	
POLST Completed during PC consultation	0.61 (0.58,0.64)	<0.001
	N = 59,220	
Advance directives completed during PC consultation	0.80 (0.73,0.87)	<0.001
Discharge Disposition:	N = 64,464	
Discharged alive	0.19 (0.18,0.20)	<0.001
Discharge Location	N = 47,323	
Home	0.48 (0.46,0.50)	<0.001
Inpatient	2.4 (2.32,2.53)	<0.001
Non-Hospital Facility	1.0 (0.96,1.05)	0.85
Service provided if discharged	N = 43,219	
None	1.24 (1.19,1.30)	<0.001
	N = 43,180	
Nursing Home	0.65 (0.62,0.69)	<0.001
	N = 43,162	
Clinic-based PC	0.41 (0.36,0.47)	<0.001
	N = 43,162	
Home-based PC	0.48 (0.44,0.54)	<0.001
	N = 43,219	
Hospice	1.07 (1.03,1.12)	0.001

<sup>a</sup> All mixed effects multivariate logistic regression models include PC team clustering as a random effect, and age, gender, and primary diagnosis as fixed effects.

<sup>b</sup> Of patients reporting moderate to severe symptom distress at initial assessment.

Abbreviations: PC = palliative care; ICU = intensive care unit; OR = odds ratio; POLST = Physician Order for Life-Sustaining Treatments; DNR = do-not-resuscitate; DNI = do-not-intubate.

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