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Palliative Care Needs in the Neuro-ICU

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Abstract

Objective—Patients admitted to the neurological or neurosurgical intensive care unit (neuro-ICU) are likely to have palliative care needs. The goals of this project are to encourage the ICU team to identify palliative care needs for patients and their families and potential ways to meet those needs.

Design—Quality improvement project using a parallel-group prospective cohort design.

Setting—Single neuro-ICU at a large, academic medical center.

Patients—All patients admitted to the neuro-ICU from September 1, 2013 to November 30, 2013.

Intervention—We developed a Palliative Care Needs Screening Tool consisting of 4 questions: (1) Does the patient have distressing physical or psychological symptoms? (2) Are there specific support needs for patient or family? (3) Are treatment options matched with patient-centered goals? (4) Are there disagreements among teams and family? We implemented this daily screening tool on morning rounds for 1 of 2 neurocritical care services that alternate admitting days to a single neuro-ICU. We examined prevalence and nature of palliative care needs and actions to address those needs, comparing the services with and without screening.

Measurements and main results—Over the 3-month period, 130 patients were admitted to the service with screening, and 132 patients to the service without screening. The two groups did not differ in regards to age, gender, Glasgow coma scale or diagnosis. Palliative care needs were identified in 62% of screened patients (80/130). Needs were mainly social support (53%) and establishing goals of care (28%). Screening was associated with more documented family conferences ($p=0.019$) and a trend towards more palliative care consultations ($p=0.056$).

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Conclusions—We developed a brief palliative care needs screening tool that identified palliative care needs for 62% neuro-ICU patients. This tool was associated with actions to meet these needs, potentially improving care for patients and their families.

Keywords

Palliative care; neuro-critical care; end-of-life care; severe acute brain injury

Introduction

Acute neurological conditions threaten what many would call their essence of human being: cognition, communication, and identity. Patients admitted to the neurological and neurosurgical intensive care unit (neuro-ICU) have a high risk of death; severe physical and cognitive impairments usually prevent them from participating in their own treatment decisions. These patients and their families likely have a high degree of palliative care needs, but little is known about the prevalence and the exact nature of these needs, nor how they can best be met. Recent guidelines for the management of patients with stroke highlight the importance of implementing palliative care for patients with severe stroke, but the best ways to identify palliative care needs and address those needs remain unclear [1].

Palliative care aims to relieve physical, social, psychological, and spiritual suffering to patients and their families [1]. Palliative care is appropriate at any age and at any stage of a serious illness regardless of the prognosis and regardless of whether the patient survives this illness. The Improving Palliative Care in the ICU Project recommends selecting previously-published triggers for palliative care consultation among critically ill patients and tailoring them to the specific needs of the individual ICU [2]. One such set of previously identified triggers were validated in a medical ICU and consist of the following 5 characteristics: (a) ICU admission following a hospital stay greater than or equal to 10 days; (b) age greater than 80 with two or more life-threatening comorbidities (as defined by Acute Physiology and Chronic Health Evaluation II definitions of severe chronic organ insufficiency); (c) diagnosis of active stage IV malignancy; (d) status post cardiac arrest; or (e) diagnosis of intracerebral hemorrhage requiring mechanical ventilation [3]. These triggers identify patients at high risk for palliative care needs, but do not directly assess the palliative care needs themselves. Instead of identifying potential need for palliative care *consultation* through diagnosis-based or length-of-stay triggers, we aimed to determine the prevalence of unmet palliative care *needs* in our patient population and to explore the effect of a palliative care *needs* screening tool (PNST) on patient care and outcomes.

We conducted this pilot quality improvement project in one hospital with a 30-bed neuro-ICU and two distinct neurocritical care services that admit patients on alternate days to the same ICU. We implemented a palliative care screening tool for one service with the following four goals: first, to encourage ICU clinicians to identify the prevalence of palliative care needs among patients in the neuro-ICU; second, to compare the care received by patients on the service with palliative care screening with those on the service without screening (including documentation of a family meeting and involvement of palliative care, social work, or psychology as well as patient outcomes including ICU length of stay and

hospital mortality); third, to compare palliative care needs identified by this screening tool to needs identified by previously published triggers for palliative care consultation [3]; and finally, to compare patients with palliative care needs to those without palliative care needs in terms of patient characteristics, services received, and outcomes.

Materials and Methods

We conducted this pilot quality improvement project implementing a palliative care needs screening tool in one of two neurocritical care services in one hospital. Because it was a quality improvement project, it was determined to be exempt from review by the University of Washington institutional review board.

Palliative care needs screening tool

Through literature review and expert discussions, we developed a Palliative Care Needs Screening Tool (PNST) for daily use by the ICU team as part of the daily goals checklist [4] in the neuro-ICU. The PNST consists of 4 questions that are answered with yes or no with an option for action items about how these will be addressed: 1. Does the patient have distressing physical and/or psychological symptoms? 2. Are there specific social/support needs for patient and/or family? 3. Have goals of care been identified and are treatment options matched with patient-centered goals? 4. Are there disagreements within teams, family or between those? These questions were pilot-tested for implementation with 7 ICU physicians and 5 neuro-ICU nurses through one-on-one meetings, electronic communication and a works-in-progress presentation.

Setting and implementation

Harborview Medical Center is a large academic county hospital that serves patients from all over the Pacific Northwest. As a comprehensive stroke center and Level I trauma center, many of the most severely affected victims in the region are admitted to our institution. The neuro-ICU consists of 30 beds and includes a dedicated ICU nursing staff with training in neurocritical care. The physician teams use a co-management approach with a critical care team (board-certified intensivists working with anesthesia, neurosurgery, and emergency medicine residents as well as critical care fellows and critical care nurse practitioners) with either the neurology team (board certified neurologists, neurology residents and stroke fellows) or the neurosurgery team (board certified neurosurgeons and neurosurgery residents and fellows). There are two co-managed ICU teams that alternate admissions every other day. The neuro-ICU admits approximately 500 patients with strokes and 400 patients with traumatic brain injury yearly.

We implemented the PNST during daily interdisciplinary work-rounds for every patient on one of the two neurocritical care services. Every morning, after each case presentation and discussion, the 4 screening questions were read to the clinical team by one of the ICU team members, most often the critical care nurse practitioner. Questions about the presence of palliative care needs were answered by anyone on the team with yes or no, and responses to identified needs were left to the clinical team to address and document without further intervention of this project. A patient could have any number of needs on any given day.

Data collection

We collected all palliative care needs screening tools during the evaluation period. In addition, we collected information from all patient medical records (both neuro-ICU services) on the following patient variables: age, gender, diagnosis, median GCS over the entire ICU stay, length of stay and discharge destination, documentation of an interdisciplinary family meeting, code status and consultations with Social Work, Palliative Care, Spiritual Care and Psychology. The diagnosis of stroke is defined as ischemic stroke, or intraparenchymal or subarachnoid hemorrhage. For patients on the service with palliative care needs screening, we also collected data from the medical record regarding meeting previously published triggers for palliative care consultation [3]. Eligible patients were all those admitted to the neuro-ICU from September through November 2013 and who stayed in the ICU for more than 24 hours. Patients were excluded if they were under age 18 years.

Data Analysis

1. Prevalence of needs identified by the Palliative Care Screening Tool—

Descriptive statistics were used to characterize the prevalence of palliative care needs in the sample with screening.

2. Comparison of care received for patients on the services with and without screening—

To compare patient care on the two neurocritical care services, we used regression approaches, adjusted *a priori* for patient age, gender and GCS. We examined the following outcomes: hospital and ICU length of stay for all patients and for patients who died or were discharged from the ICU with comfort measures only; hospital and ICU discharge destination; social worker involvement; spiritual care service involvement; palliative care service involvement; psychologist involvement; family conference documentation; and code status at death or ICU discharge. “Comfort measures only” in this institution, and for the purpose of this project, was defined as the process of withdrawing all life-sustaining treatments including endotracheal tubes, mechanical ventilation, artificial nutrition and hydration, and instead focusing solely on the comfort of the patient. For length of stay variables, we used linear regression; for family meetings and specialty consultations, we used logistic regression; and for ICU and hospital discharge destination, we used multinomial regression.

3. Previously-published palliative care consult triggers vs. palliative care needs—

We used descriptive statistics to compare the prevalence of palliative care needs identified from our screening measure to those identified using diagnosis-based triggers for palliative care consultation [3].

4. Comparison of patients with and without palliative care needs identified by screening—

Differences between patients with and without palliative care needs (on the service with screening) were examined using unadjusted analyses: chi square tests were used for categorical variables (patient sex, diagnosis, ICU and hospital discharge locations, ICU and final code status) and t-tests were used for continuous variables (age, ICU and hospital length of stay). Logistic regression models, adjusted for age, gender and GCS, were used to assess the association between each of the four identified needs and care received (e.g.,

documentation of a family conference, social work consult, spiritual care consult, palliative care consult, psychology consult); we also examined whether the identification of any 1 of the 4 needs was associated with services received.

For all statistical tests, statistical significance was set at $p = 0.05$.

Results

For the neuro-ICU service that implemented palliative care needs screening, 130 patients were admitted over 3 months with a mean age of 55.8 years (SD 18), a median GCS collected throughout the ICU stay of 13.0 (IQR 10-14), and less than half were women (41.5%; $n=54$). The most common diagnosis was stroke (46.2%; $n=60$), followed by traumatic brain injury (23.8%; $n=31$). Patients on the service without palliative care needs screening were similar, with 132 patients admitted over 3 months, a mean age of 56.5 years (SD 18.5), a median GCS throughout the ICU stay of 13.0 (IQR 10-14), and 40.9% were women ($n=54$). The most common diagnoses were stroke (48.5%; $n=64$) and traumatic brain injury (25%; $n=33$) (**Table 1**).

1. Prevalence of Needs identified by the Palliative Care Screening Tool

Among patients on the service with palliative care needs screening ($n=130$), unmet palliative care needs were identified by ICU clinicians in 62% of patients ($n=80$). The most common need identified was social support, identified in 53% of patients ($n=69$), followed by determination of goals of care in 28% of patients ($n=36$) and distressing symptoms in 12% ($n=16$). Disagreements within or between teams and family were rare at 3% (4 patients) (**Figure 1**).

2. Comparison of care received for patients on the services with and without screening

Patients on the service with palliative care needs screening were more likely to have a family conference documented than were patients on the service for which the screening tool was not used ($p=0.019$). On discharge from the ICU, the proportion of patients who died or were discharged from the ICU with comfort measures only was similar in both patient groups, as was overall length of stay (**Table 2**). We found a trend towards more palliative care consultations in screened neuro-ICU patients compared with those not screened ($p=0.056$). There was no significant difference in involvement of social work, spiritual care, or psychologists (**Table 2**).

3. Previously-published palliative care consult triggers vs. palliative care needs

Thirty-seven (46.3%) of our screened patients met previously published diagnostic triggers [3]. Overlap in identification of palliative care needs occurred in 41.3% ($n=33$) of the 80 patients identified using the palliative care needs screen; all qualified with a diagnosis of intraparenchymal hemorrhage with mechanical ventilation. The palliative care needs screen missed only four patients identified using diagnostic triggers, all of which qualified with a diagnosis of active stage IV malignancy. We also examined palliative care consultations received by patients who met the diagnosis-based triggers compared to those who did not:

among the 37 patients meeting a diagnosis-based trigger, 14% (n=5) received a palliative care consult vs. 10% patients not meeting a diagnosis-based trigger (9/93; $p=0.452$).

4. Comparison of patients with and without palliative care needs identified by screening

For the patients from the screened service, we compared the characteristics of those with (n=80) and without (n=50) identified palliative care needs. More patients with identified needs died ($p=0.03$) or were discharged from the ICU on comfort measures only ($p=0.01$); they had longer lengths of stay, both in the hospital ($p=0.002$) and in the ICU ($p<0.001$); there were no differences between these groups by age or gender (**Table 3**).

We also explored whether the identification of palliative care needs was associated with specific care that might be designed to meet those needs (**Table 4**). When any of the four palliative care needs were identified, the following care and consultation services were more likely to occur: documentation of a family conference (OR 7.90; $p = 0.001$), social work consultation (OR 2.64; $p = 0.020$), and spiritual care consultation (OR 3.69; $p = 0.008$). In terms of specific needs, the identification of “social support” needs was associated with consultation of psychology (OR 9.1; $p=0.044$) and documentation of a family conference (OR 5.8; $p= 0.001$). Patients in whom clinicians identified “distressing symptoms” were more likely to have a social worker involved (OR 4.94; $p = 0.046$) and a family conference documented (OR 4.56, $p=0.025$). When the palliative need “establishing goals of care” was identified, a family conference was more likely to be documented (OR 3.39; $p = 0.022$).

Discussion

Palliative care needs of patients admitted to ICUs are great and often unmet [5]. The palliative care needs of patients with neurologic conditions in an ICU are likely to be different from medical patients and may require different strategies to address them [6-8]. In this context, our project examined an approach to screening for palliative care needs that focuses on the actual palliative care *needs* of patients and families as perceived by the ICU clinicians on rounds and suggests that palliative care needs are common in the neuro-ICU. We found these needs mainly focus on social support for the patient and their family members as well as determination of the goals of care. An alternative approach to screening for palliative care is to use diagnosis or severity-of-illness triggers [2, 3, 9, 10]. When compared to a previously published set of triggers based on diagnosis or severity of illness, the number of patients meeting palliative care triggers was higher with our needs-based approach [3].

The recent advances in palliative care promote early palliative care *along with* curative treatment [11] and may be especially relevant for patients with severe acute brain injury. Integration of palliative care in the ICU has been conceptualized as fitting three models: an integrative model involving education in palliative care for ICU clinicians, a consultation model involving use of palliative care consultants from outside the ICU, and a mixed model involving both integrative and consultative approaches [12]. A mixed model of palliative care may be particularly useful in the neuro-ICU, where palliative care needs may be influenced by specialized prognostication and treatment options [13, 14]: Given the acuity with which most patients present to the neuro-ICU, some important components of palliative

care will inevitably fall to the neuro-ICU clinicians. In the context of the proposed care framework that distinguishes primary palliative care (skills that all clinicians should have) from specialist palliative care (palliative care specialty skills for managing more complex and difficult cases), it seems likely that in the neuro-ICU both primary and specialty palliative care will be needed [15]. Our findings support this hypothesis by showing that palliative care needs screening identified needs that seemed to be addressed in multiple ways.

The potential advantages of diagnosis-based palliative care triggers include less subjectivity: such a screening tool could be implemented by clerical staff or computer screening. However, a needs-based approach encourages the team to discuss palliative care needs and, with the identification of these needs, to develop action items for unmet needs. For example, we found that use of a palliative care screening tool was associated with increased use of interdisciplinary family conferences. One explanation for why identification of any palliative care needs in our quality improvement project did not lead to significantly more palliative care consults may be that the primary neuro-ICU team was able to meet most of the needs without the assistance of palliative care specialists, and that the subset of patients who would benefit from specialist palliative care was too small to identify in this study. It is also possible that palliative care needs remained unmet in these patients, and a palliative care consult should have been triggered in more patients with palliative care needs identified. In this quality improvement project, we cannot determine whether the screening tool resulted in increased use of any of the services, but our findings do suggest that there are specific services that can be used to meet palliative care needs for patients and their families in the neuro-ICU.

We also demonstrated that, among patients who underwent screening for unmet palliative care needs, those patients with palliative care needs identified were more likely to die in the ICU or be transferred to the acute care floor with comfort measures only and that these patients had a longer ICU and hospital length of stay. These findings provide validation that the screening tool identified patients at higher risk of death and prolonged ICU and hospital stay. In addition, patients with identified palliative care needs were more likely to have interdisciplinary family conferences as well as social work, spiritual care, and psychologists involved in their care, providing evidence that these needs were addressed, at least in part, by the ICU team and with referrals to other clinicians to provide support for patients and family members.

Although we identified the prevalence of unmet palliative care needs from the perspective of the ICU clinicians, we need to learn much more about how well this tool predicts palliative care needs from the perspective of the patient and family and the best way to address these palliative care needs. We found that use of the palliative care needs screening tool was associated with more documentation of family conferences, suggesting that the daily screen increases communication and awareness among team members about potential palliative care needs the patient and family may have; our screening tool may encourage the ICU team to consider using family meetings and other supporting clinicians to meet patient and family needs [16]. Whether the use of a palliative care needs screening tool can lead to higher quality care, higher satisfaction, and improved symptoms and quality of life for patients and

families requires further study. We found that screening for palliative care needs daily was not associated with increased mortality or an increase in transitions to comfort measures only. This study has several important limitations. First, our screening tool was intentionally short and the questions broad. A more expansive tool such as the Memorial Symptom Assessment Scale could have measured different symptoms and needs more specifically [17]. However, we designed our screening tool for use by our ICU clinicians as part of daily rounds on every patient; it was therefore essential that the tool be brief and also inclusive. Our goal was not to measure symptoms or other palliative care needs, but rather to prompt the ICU team to think about whether there were ongoing symptoms or needs that should be addressed. Future studies should address whether a more expansive screening tool would be feasible and effective. Second, this project did not randomly assign patients to each service; patients were assigned using the usual rotational mechanism and the service, rather than the patient was assigned to the screening/control condition. This sampling method may have introduced bias associated with having different attending and resident physicians on each service. However, junior and senior residents from different disciplines are equally distributed, and attending physicians switch weekly allowing for an overall mix over 12 weeks. In addition, the same nurses care for all patients, which could introduce “contamination” that would be expected to bias the results toward the null hypothesis. The best way to mitigate against this potential contamination would be to involve multiple different Neuro ICUs in a cluster-randomized trial, which was beyond the scope of this study. Third, because this was a quality improvement project, there was limited oversight on the use of the daily screen, and no attempt to control what the ICU teams did to meet the identified palliative care needs. Finally, our sample sizes were relatively small, especially for patients who received palliative care consultation, and there may be differences that we were not powered to identify. A larger sample size would allow additional and more detailed comparisons between the groups.

In conclusion, patients admitted to a neuro-ICU have a high degree of palliative care needs that focus on social support and goals of care. A needs-based tool such as ours may help to optimally plan and provide primary or specialist palliative care to patients and families in the neuro-ICU. Future studies are needed to determine the optimal screening tool, and whether the daily use of such a screen leads to improved primary palliative care, increased and appropriate use of specialty palliative care consultations, and better clinical outcomes.

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References

1. Holloway RG, Arnold RM, Creutzfeldt CJ, Lewis EF, Lutz BJ, McCann RM, et al. Palliative and end-of-life care in stroke: A statement for healthcare professionals from the American Heart Association.

association/american stroke association. *Stroke; a journal of cerebral circulation*. 2014; 45:1887–1916.

2. Nelson JE, Curtis JR, Mulkerin C, Campbell M, Lustbader DR, Mosenthal AC, et al. Choosing and using screening criteria for palliative care consultation in the icu: A report from the improving palliative care in the icu (ipal-icu) advisory board. *Crit Care Med*. 2013; 41:2318–2327. [PubMed: 23939349]
3. Norton SA, Hogan LA, Holloway RG, Temkin-Greener H, Buckley MJ, Quill TE. Proactive palliative care in the medical intensive care unit: Effects on length of stay for selected high-risk patients. *Crit Care Med*. 2007; 35:1530–1535. [PubMed: 17452930]
4. Pronovost P, Berenholtz S, Dorman T, Lipsett PA, Simmonds T, Haraden C. Improving Communication in the ICU Using Daily Goals. *J Crit Care*. 2003; 18:71–75. [PubMed: 12800116]
5. Nelson JE, Azoulay E, Curtis JR, Mosenthal AC, Mulkerin CM, Puntillo K, et al. Palliative care in the icu. *J Palliat Med*. 2012; 15:168–174. [PubMed: 22280492]
6. Dallara A, Tolchin DW. Emerging subspecialties in neurology: Palliative care. *Neurology*. 2014; 82:640–642. [PubMed: 24536063]
7. Holloway RG, Ladwig S, Robb J, Kelly A, Nielsen E, Quill TE. Palliative care consultations in hospitalized stroke patients. *J Palliat Med*. 2010; 13:407–412. [PubMed: 20384501]
8. Kross EK, Engelberg RA, Downey L, Cuschieri J, Hallman MR, Longstreth WT Jr. et al. Differences in end-of-life care in the icu across patients cared for by medicine, surgery, neurology, and neurosurgery physicians. *Chest*. 2014; 145:313–321. [PubMed: 24114410]
9. Hua MS, Li G, Blinderman CD, Wunsch H. Estimates of the need for palliative care consultation across united states intensive care units using a trigger-based model. *Am J Respir Crit Care Med*. 2014; 189:428–436. [PubMed: 24261961]
10. Zalski R, Courage C, Edelen A, Waselewsky D, Krayem H, Latozas J, et al. Evaluation of screening criteria for palliative care consultation in the micu: A multihospital analysis. *BMJ Support Palliat Care*. 2014; 4:254–262.
11. Temel JS, Greer JA, Muzikansky A, Gallagher ER, Admane S, Jackson VA, et al. Early palliative care for patients with metastatic non-small-cell lung cancer. *N Engl J Med*. 2010; 363:733–742. [PubMed: 20818875]
12. Nelson JE, Bassett R, Boss RD, Brasel KJ, Campbell ML, Cortez TB, et al. Models for structuring a clinical initiative to enhance palliative care in the intensive care unit: A report from the ipal-icu project (improving palliative care in the icu). *Crit Care Med*. 2010; 38:1765–1772. [PubMed: 20562699]
13. Diringner MN, Edwards DF, Aiyagari V, Hollingsworth H. Factors associated with withdrawal of mechanical ventilation in a neurology/neurosurgery intensive care unit. *Crit Care Med*. 2001; 29:1792–1797. [PubMed: 11546988]
14. Becker KJ, Baxter AB, Cohen WA, Bybee HM, Tirschwell DL, Newell DW, et al. Withdrawal of support in intracerebral hemorrhage may lead to self-fulfilling prophecies. *Neurology*. 2001; 56:766–772. [PubMed: 11274312]
15. Quill TE, Abernethy AP. Generalist plus specialist palliative care--creating a more sustainable model. *N Engl J Med*. 2013; 368:1173–1175. [PubMed: 23465068]
16. Thaler, R.; Sunstein, C. *Nudge: Improving Decisions about Health, Wealth, and Happiness*. Yale University Press; New Haven: 2008.
17. Portenoy RK, Thaler HT, Kornblith AB, Lepore JM, Friedlander-Klar H, Kiyasu E, et al. The Memorial Symptom Assessment Scale: an instrument for the evaluation of symptom prevalence, characteristics and distress. *Eur J Cancer*. 1994; 30:1326–1336. [PubMed: 7999421]

Figure 1.
Proportion of identified palliative care needs in 130 screened patients

Table 1

Sample characteristics

	All (262)	Service without palliative care needs screening (132)	Service with palliative care needs screening (130)
<i>Mean Age (SD)</i>	56.2 (18.0)	56.5 (18.2)	55.8 (18.0)
<i>Female Sex, % (n)</i>	41.2 (108)	40.9 (54)	41.5 (54)
<i>Median GCS during ICU stay (IQR)</i>	13.00 (10-14)	13.00 (10-14)	13.00 (10-14)
<i>Diagnosis, % (n)</i>			
<i>Stroke</i>	47.3 (124)	48.5 (64)	46.2 (60)
<i>TBI</i>	24.4 (64)	25.0 (33)	23.8 (31)
<i>Tumor</i>	12.6 (33)	10.6 (14)	14.6 (19)
<i>Other</i>	15.6 (41)	15.9 (21)	15.4 (20)

SD = Standard Deviation; GCS = Glasgow Coma Scale; ICU = Intensive Care Unit; IQR = Interquartile Range; TBI = Traumatic Brain Injury

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Table 2

Comparison between the services with vs. without screening for palliative care needs: Association with processes and outcomes of care

	All (262)	Service without palliative care needs screening (132)	Service with palliative care needs screening (130)	b	P*
Length of stay in the ICU and hospital					
<i>All patients</i>					
Median length of stay in ICU (IQR)	5 (3, 10)	5 (3, 11)	5 (3, 10)	-1.08	0.195
Median length of stay in hospital (IQR)	11 (7, 21)	11 (7, 21)	11 (6, 8, 20)	-0.83	0.636
Patients dying in the ICU or discharged with Comfort Measures Only					
Median length of stay in ICU (IQR) [n]	6 (4, 11) [31]	6 (4, 12) [15]	4.5 (3, 7) [16]	-1.75	0.559
Median Length of stay hospital (IQR)[n]	6 (4, 12) [31]	11 (5, 16) [15]	5 (3, 8.5) [16]	-4.63	0.183
ICU and Hospital Discharge					
<i>ICU discharge location, % (n)</i>					
Home	4.6 (12)	3.8 (5)	5.4 (7)	0.24	0.776
Floor	86.6 (227)	88.6 (117)	84.6 (110)	-0.21	0.723
Death	7.3 (19)	5.3 (7)	9.2 (12)	-ref-	-ref-
Other	1.5 (4)	2.3% (3)	0.8 (1)	-1.44	0.258
Discharge from ICU with Comfort Measures Only, % (n)	10.7 (28)	10.6 (14)	10.8 (14)	-0.55	0.322
Died in the ICU or discharged on Comfort Measures Only (n)	11.8 (31)	11.4 (15)	12.3 (16)	-0.37	0.481
Hospital discharge location, % (n)					
Death	12.6 (33)	10.6 (14)	14.6 (19)	-ref-	-ref-
Home	40.1 (105)	37.1 (49)	43.1 (56)	0.27	0.654
Rehab	14.9 (39)	15.9 (21)	13.8 (18)	-0.09	0.892
SNF	27.9 (73)	29.5 (39)	26.2 (34)	-0.16	0.760
Other	4.6 (12)	6.8 (9)	2.3 (3)	-1.03	0.227
Differences in care delivered					
Social work involved, % (n)	66.8 (175)	65.2 (86)	68.5 (89)	0.06	0.815
Spiritual Care involved, % (n)	29.0 (76)	25.8 (34)	32.3 (42)	0.26	0.385

	All (262)	Service without palliative care needs screening (132)	Service with palliative care needs screening (130)	b	* P
<i>Palliative Care involved, % (n)</i>	7.3 (19)	3.8 (5)	10.8 (14)	1.07	0.056
<i>Psychologist involved, % (n)</i>	5.7 (15)	3.8 (5)	7.7 (10)	0.76	0.186
<i>Family conference documented, % (n)</i>	28.2 (74)	22.0 (29)	34.6 (45)	0.86	0.019
<i>Code status at ICU discharge, % (n)</i>					
<i>Full code</i>	68.3 (179)	65.9 (87)	70.8 (92)	-0.03	0.955
<i>DNR</i>	6.1 (16)	7.6 (10)	4.6 (6)	-0.69	0.294
<i>CMO</i>	14.1 (37)	12.1 (16)	16.2 (21)	-ref-	-ref-
<i>Not addressed</i>	11.5 (30)	14.4 (19)	8.5 (11)	-0.62	0.344

SD = Standard Deviation; ICU = Intensive Care Unit; SNF = Skilled Nursing Facility; DNR = Do Not Resuscitate; CMO = Comfort Measures Only

* Regression models adjusted for age, gender, Glasgow Coma Scale

Table 3

Characteristics of patients on the service with palliative care screening and comparison of patients with palliative care needs to those without palliative care needs

	All patients on service with palliative care needs screening (130)	No palliative care needs identified (50)	Palliative care needs identified (80)	P [*]
<i>Age, mean (SD)</i>	55.83 (17.98)	53.84 (17.77)	57.08 (18.11)	0.320
<i>Female sex, % (n)</i>	41.5 (54)	44.0 (22)	40.0 (32)	0.653
<i>Diagnoses, % (n)</i>				0.081
Stroke	46.2 (60)	42.0 (21)	48.8 (39)	
TBI	23.8 (31)	24.0 (12)	23.8 (19)	
Tumor	14.6 (19)	24.0 (12)	8.8 (7)	
Other	15.4 (20)	10.0 (5)	18.8 (15)	
<i>ICU discharge location, % (n)[*]</i>				0.029
Death	9.2 (12)	0.0 (0)	15.0 (12)	
Home	5.4 (7)	6.0 (3)	5.0 (4)	
Floor	84.6 (110)	94.0 (47)	78.8 (63)	
Other	0.8 (1)	0.0 (0)	1.3 (1)	
<i>Discharge from ICU with comfort measures only, % (n)</i>	10.8 (14)	2.0 (1)	16.3 (13)	0.011
<i>Hospital discharge location, % (n)</i>				0.093
Death	14.6 (19)	8.0 (4)	18.8 (15)	
Home	43.1 (56)	56.0 (28)	35.0 (28)	
Rehab	13.8 (18)	16.0 (8)	12.5 (10)	
SNF	26.2 (34)	18.0 (9)	31.3 (25)	
Other	2.3 (3)	2.0 (1)	2.5 (2)	
<i>Final Code Status, % (n)</i>				0.018
Full	70.8 (92)	74.0 (37)	68.8 (55)	
DNR	4.6 (6)	2.0 (1)	6.3 (5)	
CMO	16.2 (21)	8.0 (4)	21.3 (17)	
Not addressed	8.5 (11)	16.0 (8)	3.8 (3)	
<i>ICU length of stay, median (IQR)</i>	5 (3, 10)	3 (2.75, 7)	6 (3.25, 12.75)	< 0.001
<i>Hospital length of stay, median (IQR)</i>	11 (6.8, 20)	8 (5, 15.25)	12 (7, 27)	0.002

SD = standard deviation; TBI = traumatic brain injury; ICU = Intensive Care Unit; SNF = Skilled Nursing Facility; DNR = Do Not Resuscitate; CMO = Comfort Measures Only

^{*} χ^2 tests for categorical variables, t-tests for continuous variables

Table 4

Association of palliative care needs with care or services received

Palliative Care Need Identified Intervention	OR	P	95% CI
<i>Any of the palliative care needs identified</i>			
<i>Family conference documented</i>	7.90	0.001	2.390, 26.099
<i>Social work involved</i>	2.64	0.020	1.165, 5.983
<i>Spiritual care involved</i>	3.69	0.008	1.406, 9.689
<i>Palliative care involved</i>	2.55	0.258	0.504, 12.930
<i>Psychologist involved</i>	6.25	0.258	0.733, 53.278
1. Does the patient have distressing physical and/or psychological symptoms? - YES			
<i>Family conference documented</i>	4.56	0.025	1.208, 17.245
<i>Social work involved</i>	4.94	0.046	1.026, 23.808
<i>Spiritual care involved</i>	2.12	0.209	0.657, 6.851
<i>Palliative care involved</i>	0.87	0.897	0.097, 7.762
<i>Psychologist involved</i>	2.31	0.341	0.411, 13.014
2. Are there specific social/support needs for patient and/or family? - YES			
<i>Family conference documented</i>	5.80	0.001	2.002, 16.822
<i>Social work involved</i>	2.19	0.060	0.968, 4.960
<i>Spiritual care involved</i>	2.19	0.071	0.935, 5.171
<i>Palliative care involved</i>	2.30	0.250	0.556, 9.545
<i>Psychologist involved</i>	9.13	0.044	1.064, 78.331
3. Have goals of care been identified and are treatment options matched with patient-centered goals? - YES			
<i>Family conference documented</i>	3.39	0.022	1.193, 9.624
<i>Social work involved</i>	1.93	0.204	0.700, 5.324
<i>Spiritual care involved</i>	2.47	0.062	0.957, 6.351
<i>Palliative care involved</i>	3.53	0.056	0.971, 12.833
<i>Psychologist involved</i>	0.62	0.586	0.107, 3.533
4. Are there disagreements within teams, family or between those? - YES			
<i>Family conference documented</i>	0.18	0.217	0.130, 2.677
<i>Social work involved</i>	1	(omitted)	
<i>Spiritual care involved</i>	2.91	0.405	0.236, 35.803
<i>Palliative care involved</i>	1.10	0.942	0.08, 14.405
<i>Psychologist involved</i>	1	(omitted)	