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The Association of POLST with Intensity of Treatment Among Patients Presenting to the Emergency Department

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Abstract

Study Objective: Physician Orders for Life-Sustaining Treatment (POLST) are intended to help prevent the provision of unwanted medical interventions among patients with advanced illness or frailty who are approaching the end of life. We sought to evaluate how POLST completion and/or treatment limitations influence intensity of treatment among patients who present to the emergency department (ED).

Methods: Retrospective cohort study of adults who presented to the ED at an academic medical center in Oregon between April 2015–October 2016. POLST completion and treatment limitations were the main exposures. Primary outcome was hospital admission; secondary outcomes included ICU admission and a composite measure of aggressive treatment.

Results: 26,128 patients were included; 1,769 (6.8%) had completed POLST. Among patients with POLST, 52.1% had full treatment orders, and 6.4% had their forms accessed prior to admission. POLST completion was not associated with hospital admission (Adjusted Odds Ratio

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(aOR)=0.97, 95% confidence interval [CI] 0.84-1.12), ICU admission (aOR=0.82, 95% CI 0.55-1.22), or aggressive treatment (aOR=1.06, 95% CI 0.75-1.51). Compared to POLST with full treatment orders, treatment limitations were not associated with hospital admission (aOR=1.12, 95% CI 0.92-1.37) or aggressive treatment (aOR=0.87, 95% CI 0.5-1.52), but were associated with lower odds of ICU admission (aOR=0.31, 95% CI 0.16-0.61).

Conclusions: Among patients presenting to the ED with POLST, the majority of POLST had orders for full treatment and were not accessed by emergency providers. These findings may partially explain why we found no association of POLST with treatment intensity. However, treatment limitations on POLST were associated with reduced odds of ICU admission. Implementation and accessibility of POLST are crucial when considering its impact on the provision of treatment consistent with patients' preferences.

INTRODUCTION

Background

The Physician Orders for Life-Sustaining Treatment (POLST) Program was developed in the 1990s in Oregon to help prevent the provision of unwanted medical interventions to patients with advanced illness or frailty who are approaching the end of life.¹ The POLST paradigm, which includes Medical Orders for Life-Sustaining Treatment (MOLST) and Medical Orders for Scope of Treatment (MOST), expanded widely over the last two decades, with the majority of states now having a program under some stage of development.² Like advance directives, POLST allow patients to document their preferences regarding intensity of treatment and forms of life support that they would otherwise receive by default. However, POLST goes further than advance directives in instantiating these treatment preferences into medical orders designed to be portable across care settings.^{3, 4}

Importance

Observational studies have suggested that patients who complete POLST forms with treatment limitations are less likely to die in the hospital or receive high-intensity treatments compared to those who do not.⁴⁻⁹ Based on these data, POLST has been identified by the National Quality Forum as a preferred palliative care practice,¹⁰ and the National Academy of Medicine has recommended that states "develop and implement a [POLST] paradigm program in accordance with nationally standardized core requirements."¹¹ However, randomized controlled trials of POLST do not exist, and a systematic review did not find clear evidence that POLST completion leads to improved patient outcomes.¹²

Goals of This Investigation

The influence of POLST on the care of patients presenting to the emergency department (ED) is particularly important to elucidate given recent studies suggesting that both patients and ED clinicians may misinterpret POLST forms.^{13, 14} Moreover, no study to date has compared outcomes such as receipt of aggressive medical treatment between similar patients with and without POLST. Therefore, we designed this study to begin to understand how POLST completion, and the preferences stated as orders on POLST forms, might influence the aggressiveness of treatment provided to patients presenting to the ED. We hypothesized

that (1) the majority of patients with completed POLST forms who present to the ED would have orders for treatment limitations, and (2) treatment limitations on POLST at the time of ED presentation would be associated with less aggressive medical treatment compared to similar patients without treatment limitations on POLST.

METHODS

Study Setting

The evaluation of POLST's influence on the treatment of ED patients requires a study setting in which POLST is well-penetrated and accessible in a measurable way. The ED at Oregon Health & Science University (OHSU) offers a unique opportunity to examine such questions because of Oregon's history as the birthplace of POLST. In 2009, Oregon created a statewide POLST Registry, an electronic repository of registered POLST forms that enables providers (including emergency medical services (EMS)) immediate access to POLST 24 hours/day, seven days/week.¹⁵ In April 2015, an electronic version of POLST (ePOLST) was integrated into the electronic health record (EHR) at OHSU, the only quaternary-care academic medical center in Oregon.¹⁶ This system enables the accession and completion of POLST forms within the EHR, with direct submission of completed forms to the registry (see Appendix).¹

Study Design and Selection of Participants

Using data merged from the Oregon POLST Registry, ePOLST, and the EHR, we performed a retrospective cohort study of adult patients (aged ≥ 18 years old) who presented to the OHSU ED between April 2015-October 2016. We included all index visits for patients during the study period who were identifiable at the time of ED presentation. We included patients triaged in the ED as having urgent, emergent, or life-threatening illness. We excluded patients with >10 ED visits during the study period, as the majority of these patients presented with recurrent mental health crises or for regular hemodialysis sessions, did not have POLST forms completed, and were not presenting to the ED with acute medical issues. Patients for whom the ED disposition was left without being seen, against medical advice, elopement, transfer to another facility from the ED, or unknown were also excluded.

Study Exposures and Outcomes

Based on our hypothesis that the majority of patients who present to the ED with POLST would have orders for treatment limitations, we first defined the exposure as the presence of completed POLST in the registry prior to ED presentation. In order to examine differences in care among patients with POLST, we performed a secondary analysis in which the exposure was treatment limitations (i.e., orders for limited treatment or comfort measures only (CMO)) on Section B of POLST. Primary outcome was hospital admission. Secondary outcomes included the receipt of any form of aggressive medical treatment, as defined by a previously validated set of measures.¹⁷ These included: endotracheal intubation/mechanical ventilation, tracheostomy, gastrostomy tube insertion, hemodialysis, enteral/parenteral nutrition, cardiopulmonary resuscitation (CPR), transfusion of blood products, or chemotherapy receipt. Among admitted patients, secondary outcomes were ICU admission, ICU and hospital length of stay (LOS), and in-hospital mortality. POLST accession was

defined as a phone call to the Oregon POLST Registry and/or access of ePOLST by EMS or hospital providers (either from the field or the ED, respectively) in the 24 hours preceding hospital admission.

Among patients with POLST orders for limited treatment or CMO who were admitted to the ICU or received some form of aggressive medical treatment, we also performed a limited chart review to evaluate whether EMS or ED providers reviewed paper POLST forms prior to hospital admission.

Statistical Analyses

Demographics, visit characteristics, comorbidities, and outcomes for patients with and without POLST forms were extracted from the EHR and compared using descriptive statistics. We included patients with missing data in all multivariable analyses using a missing data indicator. For our primary analysis, we utilized the propensity score method of inverse probability of treatment weighting (IPTW) to minimize bias related to differences between patients with and without POLST.¹⁸ We also created a second set of propensity scores for our secondary analyses evaluating the association of POLST treatment order with outcomes. The weights for IPTW were developed using patient demographics, documented primary care physician, insurance status, and comorbidities using a modified Charlson Comorbidity Index scheme in the EHR.^{19–21} We generated weights for the IPTW method using R package ‘twang’ for R 3.1.1 (Vienna, Austria).²² After weighting, all covariates achieved balance between groups, defined as <10% standardized difference; therefore, these variables were not included in multivariable modeling (Appendix Figures 1 and 2, Appendix Table 1).

We conducted multivariable logistic regression for dichotomous outcomes. For LOS, we used Cox proportional hazards model censoring on death, in which the hazard ratio (HR) represents the instantaneous rate of discharge.^{23, 24} A HR over one indicates that those with the exposure had a decreased time to discharge as compared to those without; therefore, the larger the HR, the shorter the LOS. Additional covariates in the final model included patient acuity level, arrival mode (i.e., self, EMS, or unknown), and injury as primary diagnosis. ED shift and calendar season were also included to account for variability in ED staffing and occupancy. Patients without POLST were the reference group for the primary analysis. In the secondary analysis, we chose patients with full treatment orders on POLST as the reference group given the potential for POLST completion selection bias (see Appendix). Statistical methods were otherwise equivalent, except model covariates were limited to acuity level due to the limited number of patients with POLST available for analysis.

We performed several additional secondary and sensitivity analyses. First, among patients with treatment limitations on POLST and emergent- or life-threatening illness, we performed a *post-hoc* evaluation of the association of POLST accession with hospital admission. Next, we performed multiple pre-specified sensitivity analyses on LOS outcomes. We also performed a sensitivity analysis excluding education and income levels in the IPTW methods, since these variables were obtained using zip code-level data (see Appendix). Analyses were conducted using SAS 9.4. All tests were two-sided, and p-values

of <0.05 were deemed statistically significant. The study was approved by the joint OHSU/Veteran Affairs Portland Healthcare System Institutional Review Board.

RESULTS

Characteristics of Study Subjects

A total of 26,128 patients were included in the analyses; 1,769 (6.8%) of patients had completed POLST (Figure 1). Compared to patients without POLST, patients with POLST were older with higher rates of comorbidities including cancer, dementia, and congestive heart failure (Table 1). Among patients with POLST, 52.1% had full treatment orders, 33.5% had limited treatment orders, and 14.4% had CMO orders. Thirty-two patients with POLST had blank medical treatment orders. Compared to patients with treatment limitations on POLST, those with full orders were younger with lower rates of dementia, but higher rates of several chronic diseases including peripheral vascular disease, diabetes, chronic lung disease, and moderate/severe kidney disease (Table 1).

Overall, 25.5% of patients without POLST were admitted to the hospital; among these, 8.2% were admitted to the ICU, 1.8% received aggressive medical treatment, and 0.4% were discharged to hospice. In contrast, 51.7% of patients with POLST were admitted to the hospital; among these, 5.4% were admitted to the ICU, 3.9% received aggressive medical treatment, and 2.5% were discharged to hospice (Table 1). Among the 848 patients with orders for limited treatment or CMO, 32 (3.8%) were admitted to the ICU or received some form of aggressive medical treatment, and 36 (4.2%) were discharged to hospice. Among CMO patients, three (1.2%) were admitted to the ICU, one received mechanical ventilation, and none received CPR.

A total of 113 (6.4%) of patients with POLST had them accessed by EMS or hospital providers prior to hospital admission by either phone call to the POLST Registry or via ePOLST embedded in the EHR. POLST were accessed in 4.0% of patients triaged with urgent illness, 8.8% of patients with emergent illness, and 7.3% of patients with life/limb-threatening illness. Nearly 40% of patients with POLST had their forms completed or last updated in the POLST Registry >2 years prior to their presentation (Table 2). Among patients with full, limited, and CMO orders, the median (25th-75th percentile) time between POLST completion and/or update in the registry and ED presentation was 98 (30-201), 84 (30-175), and 82 (22-157) weeks, respectively. Among the 32 patients with POLST orders for limited treatment or CMO who were admitted to the ICU or received some form of aggressive medical treatment, there was no documentation of paper POLST review in the EHR during evaluation in the ED prior to hospital admission.

Main Results

In adjusted analyses, we found no association of POLST with hospital admission (OR 0.97, 95% confidence interval [CI] 0.84–1.12), ICU admission (OR 0.82, 95% CI 0.55–1.22), aggressive medical treatment (OR 1.06, 95% CI 0.75–1.51), or in-hospital mortality (OR 0.69, 95% CI 0.45–1.04) (Table 3) among patients presenting to the ED. POLST was associated with decreased hospital and ICU LOS as compared to patients without POLST

(hospital LOS HR 1.14 [95% CI 1.06–1.23] and ICU LOS HR 1.52 [95% CI 1.12–2.07]), with increased HR indicating decreased time to discharge. These findings were robust in multiple sensitivity analyses (Appendix Table 4).

Compared to POLST with full treatment orders, POLST with treatment limitations were not associated with hospital admission (OR 1.12, 95% CI 0.92 – 1.37), aggressive medical treatment (OR 0.87, 95% CI 0.5 – 1.52), in-hospital mortality (OR 1.78, 95% CI 0.92 – 3.45), or ICU LOS (HR 1.17, 95% CI 0.71–1.93). However, treatment limitations on POLST were associated with decreased hospital LOS (HR 1.14, 95% CI 1.0–1.3) and significantly lower odds of ICU admission compared to POLST with full treatment orders (OR 0.31, 95% CI 0.16–0.61) (Table 3). In *post-hoc* unadjusted subgroup analyses among patients with treatment limitations on POLST who presented with emergent or life-threatening illness, POLST accession was associated with reduced odds of hospital admission (OR 0.41, 95% CI 0.22–0.76).

Limitations

Our study is the first to examine the association of POLST with intensity of treatment among patients presenting to the ED. The presence of Oregon's mature POLST Registry and integration of ePOLST in the study site's EHR have enabled a robust and novel description of the use of POLST among acute care patients. This study also focused on patients who came to the ED, thereby potentially reducing unmeasured differences in preferences among those with and without POLST. However, several important limitations exist. This is a retrospective study performed at a single center in Oregon – a state that has experienced intensive and ongoing efforts to implement POLST over the last two decades – thereby limiting generalizability.^{1, 12} In this study, ICU admission and aggressive medical treatment were infrequent; therefore, it may be underpowered to detect significant associations of POLST preferences with these outcomes.

Because our study focused on patients who presented to the ED, we were unable to measure the quality of goals of care discussions that preceded completion of POLST or draw conclusions about the influence of POLST on care received in the pre-hospital setting. In addition, the decision to complete a POLST is not random; therefore, the potential for residual confounding exists, despite our attempt to account for these differences using propensity score methods. We were also unable to determine the frequency with which patients presented to the ED with paper POLST; however, upon brief chart review, we did not find any documentation of paper POLST review in the ED among the 32 patients with POLST treatment limitations who received aggressive care. Although no data used for statistical analyses were abstracted from this limited chart review, our approach did not adhere to standardized chart abstraction methods.²⁵ Finally, POLST-discordant care is not necessarily inappropriate or goal-discordant care. For example, hospital admission may be appropriate for patients with CMO orders whose symptom burden cannot be managed in the outpatient setting at the end of life. We were also unable to reliably capture goals of care discussions that may have occurred between patients, their surrogates, and providers during ED visits, which may have superseded POLST-documented preferences and influenced outcomes in unpredictable ways.

DISCUSSION

This study combines data from the nation's first and largest statewide POLST Registry¹⁵ and the EHR of Oregon's only quaternary care academic medical center to yield several important findings about the use of POLST in the ED. First, the majority of patients with POLST who presented to the ED had orders for full treatment. Second, EMS and ED providers rarely accessed POLST prior to hospital admission. Perhaps for these reasons, we found no difference in hospital or ICU admission, or receipt of aggressive medical treatment between patients presenting to the ED with and without POLST. However, patients with treatment limitations on POLST had significantly shorter hospital LOS and were less likely to be admitted to the ICU compared to patients with full treatment orders on POLST. Our findings a) highlight opportunities for improvement in implementation of POLST both within and upstream from the acute care setting, and b) suggest that limitations on POLST may help align treatment received in the acute care setting with patients' goals of care.

Several key factors of POLST implementation include the identification of appropriate patients for POLST completion and the accessibility of POLST in acute care settings.^{26, 27} In this study, the large proportion of patients presenting to the ED with full treatment orders on POLST was previously unreported and calls into question the appropriateness of POLST completion among these patients, who may not be representative of the target POLST population. Additionally, a large proportion of patients' POLST forms were reviewed or updated more than two years prior to their ED presentation, raising concerns about whether these POLST forms accurately reflected patients' current goals of care.

POLST completion is recommended for individuals with advanced illness or frailty who are approaching the end of life.² The completion of POLST for full code/full treatment in those *without* advanced illness or frailty may diminish the overall impact of POLST, with potentially harmful consequences.^{26–28} For instance, POLST is often used as a substitute for code status documentation among patients admitted to skilled nursing facilities or prior to elective surgeries. The use of POLST in this way may force patients to make premature decisions in hypothetical scenarios rather than known circumstances. These decisions are then preserved in the form of durable medical orders on POLST that can persist beyond any single care episode, particularly because no reliable mechanism exists to revisit POLST with changes in clinical status.²⁹ Measuring the frequency of POLST completion as a healthcare quality indicator may also contribute to overutilization among inappropriate patients.²⁷ In these settings, POLST has the potential to threaten patient-centered decision-making, increase decision-making burden on surrogates, and undermine the voluntary nature of POLST completion.^{26, 27, 29}

Our results suggest the need for health systems to develop standardized approaches to identify patients appropriate for POLST completion. These efforts could be coupled with mechanisms to readdress patients' POLST orders over time to ensure that they reflect patients' current goals of care. To this end, some hospitals have incorporated prompts in the EHR at the time of hospital discharge to help clinicians determine whether a patient is appropriate for POLST completion.¹ For patients without advanced illness or frailty who are being discharged to short-term rehabilitation facilities, clinicians could be prompted to place

discharge orders for code status alone, which satisfies the rehabilitation facilities' requirement for documented code status orders, but avoids the potential risks associated with completion of POLST in an inappropriate clinical context.^{1, 26}

The large proportion of patients presenting to the ED with full treatment orders on POLST may also diminish its potential effectiveness in the acute care setting. In our study, the rate of POLST accession by EMS and ED providers prior to hospital admission was quite low. This finding was unexpected, considering the availability of Oregon's long-standing POLST Registry, the option for ePOLST in OHSU's EHR, and Oregon's statewide implementation of several multifaceted, longitudinal interventions to improve end-of-life care.^{1, 3} Accession of advance care-planning documents such as POLST can be especially challenging for emergency providers on the frontline of medical emergencies who are trained to act quickly to save lives, often with finite time and resources. Our results highlight the need to better understand the culture and workflow of emergency providers to ensure the accessibility of POLST and advance care-planning documents while making care decisions in the ED.^{27, 28, 30} Ongoing efforts exist to try and mitigate these gaps in the quality of end-of-life care. For example, the state of Oregon is collaborating with the ED Information Exchange System to alert healthcare organizations when a person presenting to any ED in the state has a POLST in the registry.¹⁵ To further improve end-of-life care, hospitals around the country are beginning to incorporate ED-based palliative care and/or hospice services to address goals of care more urgently, although further research is needed to understand the impact of these interventions.^{31–39}

In our secondary analyses, we found that treatment limitations on POLST were associated with lower odds of ICU admission compared to full treatment orders on POLST. This result suggests that POLST orders for limited treatment or CMO (which state that the ICU should generally be avoided) may help align treatment received in the acute care setting with patients' goals of care. We also found that treatment limitations on POLST were associated with shorter hospital LOS, which could be explained by increased rates of discharge to hospice observed in these patients. Additionally, the proportion of patients with treatment limitations on POLST in our study cohort (47.9%) was substantially lower than that in the Oregon POLST Registry during the same time period (70.8%).^{9, 40} Although we did not study patients in the pre-hospital setting, the low number of patients presenting to the ED with treatment limitations on POLST may indicate that these patients avoid the acute care setting. This rationale is consistent with previous data that showed an association of POLST orders with location of death, outside of the hospital, and the level of treatments provided to patients at the end of life.^{4–9, 41}

In summary, among patients presenting to the ED with POLST, the majority of POLST had orders for full treatment and were not accessed by emergency providers. These findings may partially explain why there was no association of POLST with intensity of treatment received. However, treatment limitations on POLST were associated with shorter hospital LOS and reduced odds of ICU admission compared to full treatment orders on POLST. These results suggest that limitations on POLST may help align treatment received in the acute care setting with patients' goals of care. Implementation and accessibility of POLST

and other similar advance care-planning documents are crucial when considering their impact on the provision of treatment consistent with patients' documented preferences.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Study Flow Diagram.

*High utilizers were defined as patients with > 10 ED visits during the study period. We excluded patients who had >10 ED visits during the study period, as the majority of these patients presented with recurrent mental health crises or for regular hemodialysis sessions, did not have POLST forms, and were not presenting to the ED with acute medical issues.

†Physician Orders for Life-Sustaining Treatment

Table 1.

Patient/Visit Characteristics Among Patients Presenting to the Emergency Department, Stratified by Physician Order for Life-Sustaining Treatment (POLST) Status and Order.

Patient/Visit Characteristics	POLST Status N = 26,128			POLST Order N = 1,769		
	Without POLST N = 24,359 (93.2%)	With POLST N = 1,769 (6.8%)	Full N = 921 (52.1%)	Limited N = 593 (33.5%)	Comfort Measures Only N = 255 (14.4%)	
Age, mean (SD)	45.4 (18.1)	71.6 (15.7)	66.1 (15.5)	77.6 (14.0)	77.4 (13.2)	
Female sex, N (%)	12,174 (50.0)	976 (55.2)	482 (52.3)	341 (57.5)	153 (60.0)	
Race, N (%)						
White	19,518 (80.1)	1,539 (87.0)	787 (85.5)	532 (89.7)	220 (86.3)	
Black	1,153 (4.7)	52 (2.9)	38 (4.1)	7 (1.2)	7 (2.7)	
Other/Unknown	3,688 (15.1)	178 (10.1)	96 (10.4)	54 (9.1)	28 (11.0)	
Primary Care Physician on File, N (%)	15,660 (64.3)	1,300 (73.5)	715 (77.6)	412 (69.5)	173 (67.8)	
Insurance/Payer, N (%)						
Private	9,859 (40.5)	135 (7.6)	87 (9.4)	28 (4.7)	20 (7.8)	
Medicaid/Oregon Health Plan	6,978 (28.6)	194 (11.0)	142 (15.4)	37 (6.2)	15 (5.9)	
Medicare	5,359 (22.0)	1,409 (79.6)	673 (73.1)	521 (87.9)	215 (84.3)	
Veterans Affairs	423 (1.7)	26 (1.5)	15 (1.6)	7 (1.2)	4 (1.6)	
Other/Unknown	1,740 (7.1)	5 (0.3)	4 (0.4)	-	1 (0.4)	
Comorbidities, N (%)						
Cancer	2,458 (10.1)	473 (26.7)	239 (26.0)	159 (26.8)	75 (29.4)	
Dementia	129 (0.5)	136 (7.7)	40 (4.3)	74 (12.5)	22 (8.6)	
Myocardial infarction	1,167 (4.8)	291 (16.4)	158 (17.2)	93 (15.7)	40 (15.7)	
Congestive heart failure	1,314 (5.4)	467 (26.4)	239 (26.0)	165 (27.8)	63 (24.7)	
Peripheral vascular disease	983 (4.0)	266 (15.0)	158 (17.2)	75 (12.6)	33 (12.9)	
Cerebrovascular disease	1,729 (7.1)	495 (28.0)	254 (27.6)	168 (28.3)	73 (28.6)	
Chronic lung disease	3,235 (13.3)	500 (28.3)	277 (30.1)	163 (27.5)	60 (23.5)	
Diabetes, with end organ damage	739 (3.0)	206 (11.6)	132 (14.3)	58 (9.8)	16 (6.3)	

Patient/Visit Characteristics	POLST Status N = 26,128			POLST Order N = 1,769		
	Without POLST N = 24,359 (93.2%)	With POLST N = 1,769 (6.8%)	Full N = 921 (52.1%)	Limited N = 593 (33.5%)	Comfort Measures Only N = 255 (14.4%)	
Kidney disease, moderate/severe	1,081 (4.4)	406 (23.0)	240 (26.1)	119 (20.1)	47 (18.4)	
Liver disease, moderate/severe	360 (1.5)	73 (4.1)	46 (5.0)	21 (3.5)	6 (2.4)	
Acuity, N (%)						
Urgent	15,505 (63.7)	942 (53.3)	500 (54.3)	307 (51.8)	135 (52.9)	
Emergent	8,537 (35.0)	786 (44.4)	398 (43.2)	275 (46.4)	113 (44.3)	
Limb/life-threatening	317 (1.3)	41 (2.3)	23 (2.5)	11 (1.9)	7 (2.7)	
Primary injury diagnosis, * N (%)						
Intensity of Treatment						
Hospital Admission, N (%)	6,200 (25.5)	914 (51.7)	460 (49.9)	338 (57.0)	116 (45.5)	
Hospital Length of Stay, mean (SD) [†]	5.1 (6.1)	5.1 (5.1)	5.5 (6.04)	4.6 (3.6)	4.7 (5.0)	
ICU Admission, N (%) [‡]	510 (8.2)	49 (5.4)	36 (7.8)	10 (3.0)	3 (2.6)	
ICU Length of Stay, mean (SD) [‡]	4.6 (5.8)	4.6 (5.7)	5.2 (6.6)	2.7 (1.4)	4 (1.7)	
Aggressive medical treatment, N (%)	449 (1.8)	69 (3.9)	44 (4.8)	17 (2.9)	8 (3.1)	
Intubation/mechanical ventilation	115 (0.5)	13 (0.7)	11 (1.2)	1 (0.2)	1 (0.4)	
Tracheostomy	41 (0.2)	5 (0.3)	4 (0.4)	1 (0.2)	-	
Gastrostomy tube insertion	30 (0.1)	5 (0.3)	4 (0.4)	1 (0.2)	-	
Hemodialysis	151 (0.6)	27 (1.5)	17 (1.8)	7 (1.2)	3 (1.2)	
Enteral or parenteral nutrition	32 (0.1)	3 (0.2)	2 (0.2)	1 (0.2)	-	
Cardiopulmonary resuscitation	8 (0.0)	1 (0.1)	1 (0.1)	-	-	
Blood transfusion	228 (0.9)	42 (2.4)	29 (3.1)	8 (1.3)	5 (2.0)	
Chemotherapy	69 (0.3)	6 (0.3)	3 (0.3)	2 (0.3)	1 (0.4)	
Hospital Mortality, N (%)						
	166 (0.7)	43 (2.4)	16 (1.7)	20 (3.4)	7 (2.7)	
Discharge to Hospice, N (%)						
	100 (0.4)	44 (2.5)	8 (0.9)	26 (4.4)	10 (3.9)	

* Injury diagnosis codes were identified via ICD10 codes (S00-T35,T66-T79,V01-Y36,Y85-Y98).

[‡] Among patients admitted to the hospital.

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* Among patients admitted to the ICU.

Missing data included n=14 for sex, n=1,821 for race, n=2,330 for primary care physician on file, n=1,295 for insurance, and n=1 for hospital length of stay.

Table 2.

Characteristics of Physician Orders for Life-Sustaining Treatment (POLST) Completion and Accession by Emergency Providers Prior to Hospital Admission.

POLST Characteristics	Full (N = 921)	Limited (N = 593)	Comfort Measures Only (N = 255)
Most Recent POLST Review, N (%)			
<6 months	172 (18.7)	121 (20.4)	62 (24.3)
6-12 months	90 (9.8)	75 (12.6)	27 (10.6)
12-24 months	135 (14.7)	102 (17.2)	39 (15.3)
24 months	366 (39.7)	237 (40.0)	94 (36.9)
Unknown	158 (17.2)	58 (9.8)	33 (12.9)
POLST Accessed Stratified by Method, N (%)			
Overall	36/921 (3.9)	55/593 (9.3)	22/255 (8.6)
Emergency Medical Services Call to Registry	3/36 (8.3)	4/55 (7.3)	1/22 (4.5)
Hospital Provider Call to Registry	5/36 (13.9)	11/55 (20.0)	5/22 (22.7)
View on ePOLST	28/36 (77.8)	40/55 (72.7)	16/22 (72.7)
POLST Accessed, Stratified by Illness Acuity, N (%)			
Life-threatening	2/23 (8.7)	1/11 (9.1)	0/7 (0.0)
Emergent	22/398 (5.5)	32/275 (11.6)	15/113 (13.3)
Urgent	12/500 (2.4)	19/307 (6.2)	7/135 (5.2)

Table 3.

Association of Physician Orders for Life-Sustaining Treatment (POLST) Completion and POLST Treatment Orders with Outcomes Among Patients Presenting to the Emergency Department.*

	Hospital Admission OR (95% CI)	ICU Admission OR (95% CI)	Aggressive Medical Care [†] OR (95% CI)	Hospital Mortality OR (95% CI)	Hospital Length of Stay [‡] HR (95% CI)	ICU Length of Stay [‡] HR (95% CI)
Primary Analysis						
No POLST at presentation	Reference	Reference	Reference	Reference	Reference	Reference
POLST at Presentation	0.97 (0.84-1.12)	0.82 (0.55-1.22)	1.06 (0.75-1.51)	0.69 (0.45-1.04)	1.14 (1.06-1.23)	1.52 (1.12 – 2.07)
Secondary Analysis						
POLST Treatment Orders						
Full	Reference	Reference	Reference	Reference	Reference	Reference
Limited/Comfort Measures	1.12 (0.92-1.37)	0.31 (0.16-0.61)	0.87 (0.5-1.52)	1.78 (0.92-3.45)	1.14 (1.01-1.28)	1.17 (0.71-1.93)

OR = odds ratio; HR = hazard ratio; ICU = intensive care unit

* Additional covariates included in the model after using the propensity score method of inverse probability of treatment weighting include Emergency Department acuity level, arrival mode, and injury as primary diagnosis.

[†] Aggressive medical care is defined as endotracheal intubation and mechanical ventilation, tracheostomy, gastrostomy tube insertion, hemodialysis, enteral/parenteral nutrition, cardiopulmonary resuscitation, transfusion of any blood products, or chemotherapy receipt.

[‡] A hazard ratio over one indicates that those with the exposure had a decreased time to discharge as compared to those without; therefore, the larger the hazard ratio, the shorter the length of stay.