

Concordance of Out-of-Hospital and Emergency Department Cardiac Arrest Resuscitation With Documented End-of-Life Choices in Oregon

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Study objective: Resuscitation measures should be guided by previous patient choices about end-of-life care, when they exist; however, documentation of these choices can be unclear or difficult to access. We evaluate the concordance of a statewide registry of actionable resuscitation orders unique to Oregon with out-of-hospital and emergency department (ED) care provided for patients found by emergency medical services (EMS) in out-of-hospital cardiac arrest.

Methods: This was a retrospective cohort study of patients found by EMS providers in out-of-hospital cardiac arrest in 5 counties in 2010. We used probabilistic linkage to match patients found in out-of-hospital cardiac arrest with previously signed documentation of end-of-life decisions in the Oregon Physician Orders for Life-Sustaining Treatment (POLST) registry. We evaluated resuscitation interventions in the field and ED.

Results: There were 1,577 patients found in out-of-hospital cardiac arrest, of whom 82 had a previously signed POLST form. Patients with POLST do-not-resuscitate orders for whom EMS was called had resuscitation withheld or ceased before hospital admission in 94% of cases (95% confidence interval [CI] 83% to 99%). Compared with patients with no POLST or known do-not-resuscitate orders, more patients with attempt resuscitation POLST orders had field resuscitation attempted (84% versus 60%; difference 25%; 95% CI 12% to 37%) and were admitted to hospitals (38% versus 17%; difference 20%; 95% CI 3% to 37%), with no documented misinterpretations of the form once CPR was initiated.

Conclusion: In this sample of patients in out-of-hospital cardiac arrest, out-of-hospital and ED care was generally concordant with previously documented end-of-life orders in the setting of critical illness. Further research is needed to compare the effectiveness of Oregon's POLST system to other methods of end-of-life order documentation. [Ann Emerg Med. 2014;63:375-383.]

Please see page 376 for the Editor's Capsule Summary of this article.

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INTRODUCTION

Background

For patients with advanced illness and frailty, preferences and goals of care should guide resuscitation measures in the out-of-hospital and emergency department (ED) settings. Choices about medical management are complicated and personal and may be influenced by family support, religion, racial or ethnic background, and personal experience with hospice care.¹⁻⁴ Although advance directives are a widely available means for patients to document their preferences, they are not actionable medical orders and are often unavailable in emergency situations when it would otherwise significantly change management.^{5,6} Complicated or unclear advance directives and living wills are easily misinterpreted in the out-of-hospital and ED setting, although formal evaluation of provider interpretation of these documents remains limited.^{7,8} Expert recommendations to

improve clear and direct documentation of patient decisions have been made since the 1990s; however, proper communication of these wishes remains elusive.^{9,10} Since 1991, Oregon providers have used a standardized form, the Physician Orders for Life-Sustaining Treatments (POLST), to address and document end-of-life goals for patients with advanced illness or frailty. The POLST form is designed to be portable and actionable across treatment settings, including the home, nursing care facilities, or the hospital.¹¹ The form, signed in consultation with a medical provider, directs treating providers to provide or avoid cardiopulmonary resuscitation (CPR), antibiotics, feeding tubes, and transportation to the hospital through a series of clear and specific orders centered on goals of care. POLST orders allow documentation of more nuanced treatment preferences compared with standard do-not-resuscitate orders and are more direct than other end-of-life documentation formats.¹² POLST has found

Editor's Capsule Summary

What is already known on this topic

Although end-of-life care can be guided by advance directives, it is unknown whether the relevant information is available to out-of-hospital and emergency department (ED) providers and whether it informs care.

What question this study addressed

When out-of-hospital and ED providers treat patients who have a Physician Orders for Life-Sustaining Treatments directive, is care within the described plan?

What this study adds to our knowledge

When emergency medical services and ED records were linked for 1,557 Oregon patients experiencing out-of-hospital cardiac arrest, only 82 patients had the directive in place. Most care was within the bounds of the directive when it existed.

How this is relevant to clinical practice

This approach to out-of-hospital directives shows promise in guiding care, but current use is sparse.

good acceptance with hospice facilities, emergency medical services (EMS) providers, and nursing facilities in Oregon.¹³⁻¹⁵

Importance

Although concordance of resuscitation measures with POLST documentation is strong in nursing and hospice facilities, the utility of the POLST program has not been studied among people living independently.¹⁶ A Washington study examining non-POLST hospital documentation among patients in residential facilities found frequent discordance of care delivery with documented wishes, suggesting that patients not living in health care facilities may be more at risk of miscommunicated or uncommunicated end-of-life decisions.¹⁰ Since 2010, the Oregon POLST program has implemented a call-in database accessible to EMS and hospital providers, with the goal of expeditiously and correctly relaying previous POLST documentation. Reliability of information obtained by telephone with signed POLST orders has been previously validated.¹⁷ As the POLST form is evaluated for expansion to other states, it is necessary to assess whether out-of-hospital and ED care provided in critical situations is concordant with POLST documentation recorded before those events.

Goals of This Investigation

We sought to evaluate the concordance of care provided by out-of-hospital and hospital providers with previously

documented POLST orders in the setting of out-of-hospital cardiac arrest when 911 is called. Our primary outcome measures included resuscitation interventions at the scene, ED transport, and hospital admission. As a secondary aim, we reviewed POLST call center records to evaluate the effect of real-time access to electronic POLST forms on out-of-hospital and ED resuscitation.

MATERIALS AND METHODS

Study Design

This was a secondary analysis of a prospective cohort of patients in out-of-hospital cardiac arrest evaluated by EMS and linked to registered POLST forms from a statewide database. Institutional review boards at the state and university level approved this protocol.

Setting

The study included patients evaluated by EMS providers in out-of-hospital cardiac arrest in 5 counties surrounding Portland, OR, represented in the Oregon POLST Registry in 2010. These counties are part of the Resuscitation Outcomes Consortium and have maintained an epidemiologic prospective registry of patients with out-of-hospital cardiac arrest since 2005 (Epistry).¹⁸ Regions include urban and suburban areas, plus some outlying rural areas.

Selection of Participants

We included all patients for whom the 911 EMS system was activated in the 5 counties and were found in cardiac arrest between January 1 and December 31, 2010. The details of Epistry have been previously described.¹⁸ We excluded interhospital transfers if the initial presentation did not involve EMS or occurred outside the study region.

Methods of Measurement

The primary POLST variable was “do not attempt resuscitation” versus “attempt resuscitation” on a previously signed POLST form (Figure 1). We also evaluated the POLST-specified intensity of treatment order “comfort measures only.” We used probabilistic linkage (LinkSolv version 8.2; Strategic Matching, Inc., Morrisonville, NY) to match registered POLST forms with patients in the Epistry database during the 12-month period, by last name, first initial, birth date, sex, and location by county and state. Similar methodology has been validated for matching EMS databases to a trauma registry and for matching EMS data to other sources of administrative hospital data, with more than 98% specificity.^{19,20} All matches were individually reviewed by the authors case by case to screen for any clearly erroneous linkages while retaining logical variations in documented identifiers (eg, William for Bill, Clark for Clarke).

Patients with registered POLST forms signed after the out-of-hospital cardiac arrest event were excluded from analysis. Patients with POLST forms in the registry signed before the out-of-hospital cardiac arrest event but received by the registry afterward

HIPAA PERMITS DISCLOSURE TO HEALTH CARE PROFESSIONALS & ELECTRONIC REGISTRY AS NECESSARY FOR TREATMENT			
Physician Orders for Life-Sustaining Treatment (POLST)			
<p>Follow these orders until orders change. These medical orders are based on the patient's current medical condition and preferences. Any section not completed does not invalidate the form and implies full treatment for that section. With significant change of condition new orders may need to be written. <i>For more information on Oregon POLST visit: www.ropolst.org</i></p>	Patient Last Name:	Patient First Name	Middle Int.
	Date of Birth: (mm/dd/yyyy)	Gender: <input type="checkbox"/> M <input type="checkbox"/> F	Last 4 SSN: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
Address: (street / city / state / zip)			
A	CARDIOPULMONARY RESUSCITATION (CPR): <i>Patient has no pulse <u>and</u> is not breathing.</i>		
Check One	<input type="checkbox"/> Attempt Resuscitation/CPR <input type="checkbox"/> Do Not Attempt Resuscitation/DNR		
When not in cardiopulmonary arrest, follow orders in B and C .			
B	MEDICAL INTERVENTIONS: <i>If patient has pulse and/or is breathing.</i>		
Check One	<input type="checkbox"/> Comfort Measures Only (A)llow (N)atural (D)eath. Relieve pain and suffering through the use of any medication by any route, positioning, wound care and other measures. Use oxygen, suction and manual treatment of airway obstruction as needed for comfort. <i>Patient prefers no transfer to hospital for life-sustaining treatments. Transfer if comfort needs cannot be met in current location. Treatment Plan: Maximize comfort through symptom management.</i> <input type="checkbox"/> Limited Additional Interventions In addition to care described in Comfort Measures Only, use medical treatment, antibiotics, IV fluids and cardiac monitor as indicated. No intubation, advanced airway interventions, or mechanical ventilation. May consider less invasive airway support (e.g. CPAP, BiPAP). <i>Transfer to hospital if indicated. Generally avoid the intensive care unit. Treatment Plan: Provide basic medical treatments.</i> <input type="checkbox"/> Full Treatment In addition to care described in Comfort Measures Only and Limited Additional Interventions, use intubation, advanced airway interventions, and mechanical ventilation as indicated. <i>Transfer to hospital and/or intensive care unit if indicated. Treatment Plan: Full treatment including life support measures in the intensive care unit.</i>		
Additional Orders: _____			
C	ARTIFICIALLY ADMINISTERED NUTRITION: <i>Offer food by mouth if feasible.</i>		
Check One	<input type="checkbox"/> No artificial nutrition by tube. <i>Additional Orders:</i> _____ <input type="checkbox"/> Defined trial period of artificial nutrition by tube. _____ <input type="checkbox"/> Long-term artificial nutrition by tube. _____		
D	DOCUMENTATION OF DISCUSSION:		
<input type="checkbox"/> Patient (Patient has capacity) <input type="checkbox"/> Health Care Representative or legally recognized surrogate <input type="checkbox"/> Parent of minor <input type="checkbox"/> Surrogate for patient with developmental disabilities or significant mental health condition (Note: Special requirements for completion. See reverse side.) <input type="checkbox"/> Court-Appointed Guardian <input type="checkbox"/> Other _____			
Signature of Patient or Surrogate			
Signature: <u>recommended</u>		Name (print):	Relationship (write "self" if patient):
This form will be sent to the POLST Registry unless the patient wishes to opt out, if so check opt out box <input type="checkbox"/>			
E	SIGNATURE OF PHYSICIAN / NP/ PA		
My signature below indicates to the best of my knowledge that these orders are consistent with the patient's current medical condition and preferences.			
Print Signing Physician / NP / PA Name: <u>required</u>		Signer Phone Number:	Signer License Number: <i>(optional)</i>
Physician / NP / PA Signature: <u>required</u>		Date: <u>required</u>	Office Use Only

SEND FORM WITH PATIENT WHENEVER TRANSFERRED OR DISCHARGED, SUBMIT COPY TO REGISTRY
 © CENTER FOR ETHICS IN HEALTH CARE, Oregon Health & Science University, 3181 Sam Jackson Park Rd, UHN-86, Portland, OR 97239-3098 (503) 494-3965

Figure 1. Oregon POLST form.

were considered as having a POLST form. Patients for whom EMS ceased resuscitation because of do-not-resuscitate orders that were documented in the EMS chart, but who lacked a matched record from the POLST registry, were excluded from primary analysis and evaluated separately. The primary POLST variable was categorized by the selection of a do-not-resuscitate order or an attempt resuscitation order. Patients neither in the POLST registry nor having documented do-not-resuscitate orders by EMS providers were defined as “no POLST, no do-not-resuscitate.” For patients receiving resuscitation, demographic information included age, sex, presenting cardiac rhythm, place of arrest, bystander CPR, response interval, and witnessed arrest. For patients not receiving resuscitation, only name and date of birth were collected for Epistry. Telephone calls from treating providers (eg, EMS and ED) to the POLST registry call center were also evaluated when matched to out-of-hospital cardiac arrest patients with active POLST forms.

Outcome Measures

The primary outcome measure in this study was delivery of resuscitation, defined as any chest compressions. Delivery or cessation of resuscitation was defined at 3 points for each patient: initially at EMS arrival, before ED transport, and in the ED. For patients receiving resuscitation that was ceased before ED arrival, we assessed the reason for cessation of resuscitation, categorized from EMS documentation (considered futile, do-not-resuscitate [written or verbal], obviously dead, and unknown). Secondary outcome measures included delivery of out-of-hospital procedures (intravenous access, intraosseous access, epinephrine, cardioversion attempted, and advanced airway placement) and survival to hospital discharge.

Primary Data Analysis

We used descriptive statistics (means and proportions) to characterize the demographics and out-of-hospital cardiac arrest

presentations of these patients. We assessed primary and secondary outcomes with descriptive statistics and 2-sample tests of proportion. We calculated 95% confidence intervals (CIs) where appropriate. CIs of proportions were obtained by Clopper-Pearson exact method. Database management and analysis was completed with Stata (version 10; StataCorp, College Station, TX).

RESULTS

Characteristics of Study Subjects

There were 1,577 patients in out-of-hospital cardiac arrest who were evaluated by EMS in the 5 counties, of whom 951 (60%) had EMS resuscitation provided at the scene of arrest. Of the 36,529 patients with active POLST forms in the statewide Oregon POLST registry during 2010, we matched POLST forms with 94 out-of-hospital cardiac arrest patients found by EMS in these 5 counties; 82 of these forms were signed before the out-of-hospital cardiac arrest events. Fifty (61%) POLST forms indicated a do-not-resuscitate order and 32 (39%) specified attempt resuscitation. Of patients selecting do not resuscitate, 21 (42%) had also selected comfort measures only; 1 patient selecting attempt resuscitation had no further treatment preferences ordered on the POLST form. There were 35 patients without matched POLST forms who had EMS resuscitation ceased before ED arrival for EMS-documented do-not-resuscitate status; these patients were removed from the non-POLST group for initial analysis. Characteristics of the study sample are included in Table 1.

Main Results

Percentages of interventions and patient disposition among groups categorized by previous POLST order are included in Table 2. Of the 50 patients with a do-not-resuscitate order specified through a POLST form signed before arrest, 11 (22%)

Table 1. Demographics of patients found by EMS in out-of-hospital cardiac arrest, by POLST orders.*

Demographics	No POLST, No DNR, No. (%), n=1,448	Attempt CPR, No. (%), n=32	DNR (%), n=50
Age (mean), y	60	69	85
Female sex	298 (34)	15 (56)	6 (55)
Male sex	568 (66)	12 (44)	5 (45)
Initial rhythm: VF/VT	235 (28)	5 (19)	2 (18)
Initial rhythm: PEA	161 (19)	6 (22)	1 (9)
Initial rhythm: asystole	447 (53)	16 (59)	8 (73)
Witnessed arrest by bystander	349 (40)	14 (52)	5 (45)
Witnessed arrest by EMS	109 (13)	2 (7)	1 (9)
Received bystander CPR	390 (45)	13 (48)	5 (45)
Place of arrest: home	633 (73)	10 (37)	6 (55)
Place of arrest: street	32 (4)	2 (7)	1 (9)
Place of arrest: health care facility	27 (3)	6 (22)	1 (9)
Place of arrest: residential institution	56 (6)	9 (33)	3 (27)
Median call-to-arrival time, min:s	4:40	3:39	4:25
POLST order: comfort measures only	n/a	1	21
POLST order: limited interventions	n/a	6	27
POLST order: full treatment	n/a	24	2

DNR, Do-not-resuscitate; VF/VT, Ventricular fibrillation or ventricular tachycardia; PEA, Pulseless electrical activity.

*Patients with missing data, non-POLST DNR documentation, and forms signed after out-of-hospital cardiac arrest were excluded.

Table 2. Interventions and disposition of patients found by EMS in out-of-hospital cardiac arrest, by POLST orders.*

Demographics	No POLST, No DNR, No. (%), n=1,448	Attempt CPR, No. (%), n=32	DNR (%), n=50
Interventions and disposition			
No CPR attempted	582 (40)	5 (16)	39 (78)
CPR started, ceased before ED	284 (20)	7 (22)	5 (10)
Because of DNR order	0	0	5 (10)
Because of futility	284 (20)	7 (22)	0
After call to POLST registry	Unknown	1 (3)	4 (8)
CPR ceased in the ED	289 (20)	8 (25)	3 (6)
Admitted to hospital	248 (17)	12 (38)	3 (6)
Survived to discharge	120 (8)	5 (16)	0
Discharged from ED	8 (1)	0	0
Disposition after ED unknown	37 (3)	0	0
Advanced airway placed	737 (51)	23 (72)	6 (12)
IV placement	607 (42)	20 (63)	7 (14)
IO placement	390 (27)	16 (50)	3 (6)
Epinephrine given	669 (46)	21 (66)	5 (10)
Cardioversion/defibrillation	321 (22)	7 (22)	4 (8)

*Patients with non-POLST DNR documentation and forms signed after out-of-hospital cardiac arrest were excluded.

had resuscitation attempted by EMS personnel (Figure 2). Six of 50 patients (12%) with POLST-documented do-not-resuscitate orders were transported to the ED and 3 (6%) survived to hospital admission. By hospital admission, resuscitation efforts had been either ceased or not attempted for 94% (95% CI 83% to 99%) of patients with POLST do-not-resuscitate orders. Patients with POLST-documented do-not-resuscitate orders and receiving EMS resuscitation had no detectable age difference from those receiving no resuscitation (85 years versus 82.5 years; difference in means 2.5; 95% CI -11 to 6.1). The percentage of resuscitation measures performed was lowest in patients with POLST orders for do-not-resuscitate and comfort measures only (n=21), with 1 (5%) receiving field resuscitation efforts that were stopped in the ED. Of 32 patients with a POLST form specifying attempt resuscitation, 27 (84%) had resuscitation attempted (Figure 2). Once resuscitation was started, no patients with a POLST-documented attempt-resuscitation order had

resuscitation efforts stopped by EMS providers erroneously documenting a do-not-resuscitate order. One patient requesting attempt resuscitation but comfort measures only if pulse returned survived to hospital admission. Proportions of EMS resuscitation, ED transportation, and hospital admission from the ED were all significantly higher among patients with POLST forms specifying attempt resuscitation than those of patients with no POLST or do-not-resuscitate documentation and those with do-not-resuscitate orders.

Compared with patients without do-not-resuscitate orders or POLST registry matches, patients with attempt resuscitation POLST orders received more frequent advanced airway placement (72% versus 51%; difference 21%; 95% CI 5% to 37%), intravenous access (63% versus 42%; difference 21%; 95% CI 4% to 38%), intraosseous access (50% versus 27%; difference 23%; 95% CI 6% to 41%), and epinephrine administration (66% versus 46%; difference 19%; 95% CI 3% to 36%).

Of 366 provider calls to the Oregon POLST registry during the study period, 6 were for patients in the out-of-hospital cardiac arrest sample in these 5 counties. Four of these calls identified patients with do-not-resuscitate orders, all of whom subsequently had resuscitation ceased before transport to the ED. Two calls were linked to patients with attempt resuscitation POLST orders, 1 of whom had resuscitation efforts stopped because of medical futility and 1 of whom had resuscitation efforts stopped in the ED.

Sensitivity Analyses

Thirty-five patients without matched POLST forms had EMS documentation stating that resuscitation efforts were stopped before ED arrival because of do-not-resuscitate status. These patients were excluded from the primary analysis. For sensitivity analysis, these 35 patients were included with the POLST-confirmed do-not-resuscitate group. Statistical differences

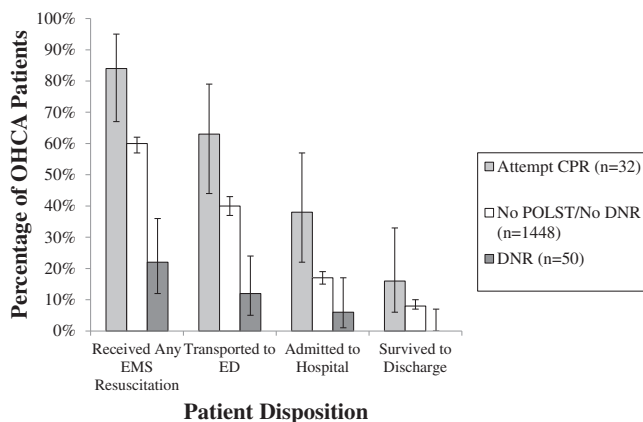


Figure 2. Resuscitation and disposition of out-of-hospital cardiac arrest patients evaluated by EMS by POLST orders. OHCA, Organized Health Care Arrangement.

between the attempt resuscitation and the do-not-resuscitate group remained significant in proportions of field resuscitation (difference 20%; 95% CI 4% to 36%), advanced airway placement (difference 21%; 95% CI 6% to 37%), intravenous access (difference 21%; 95% CI 4% to 38%), intraosseous access (difference 23%; 95% CI 6% to 41%), and epinephrine (difference 20%; 95% CI 3% to 37%).

These 37 patients without matched POLST forms were known to have been transferred to the ED, but final disposition from the ED remained unknown. Given the unavailability of inpatient records for these patients, they were assumed not to be admitted in the above analysis. When reclassifying these patients as “admitted to hospital,” the background group retained a significant difference from those patients requesting attempt resuscitation (difference 18%; 95% CI 9% to 35%).

LIMITATIONS

Although we were comprehensive in identifying all patients with existing POLST forms before arrest, there was a small portion of patients without a matched POLST form and with an EMS-charted do-not-resuscitate order. This scenario could have resulted from unmatched electronic POLST forms (eg, if there was not enough identifying information in the EMS record to successfully match the form), patients who opted out of including their POLST form in the registry, or patients who had POLST forms before legislation mandating entry into the electronic registry. We attempted to minimize misclassification bias in POLST-specified do-not-resuscitate order by restricting our definition of end-of-life decisions to patients with a matched POLST record. We excluded those unmatched but EMS-documented do-not-resuscitate patients from the primary analysis to avoid biased estimates and used a sensitivity analysis to ensure significance. However, it is likely that a further portion of additional patients receiving no resuscitation in the field had an existing do-not-resuscitate order that was not registered and not documented by EMS. This would potentially bias the no POLST, no do-not-resuscitate group toward less aggressive interventions, underestimating differences with the do-not-resuscitate group and overestimating differences with the attempt resuscitation group. The no POLST/no do-not-resuscitate group is best interpreted as a global assessment of current Oregon EMS practices and not an indicator of management of a specific group of patients.

Additionally, the 5 counties included in our sample include 2 counties in Washington bordering Oregon. Although these counties are well represented in the Oregon POLST registry, it is possible that the lack of state-mandated reporting of forms to the registry adds to the homogeneity of the unmatched group. However, excluding all Washington-based EMS agencies had minimal effect on the primary outcome variables (38% versus 40% field resuscitation, 19% versus 20% pre-ED cessation of resuscitation, and 22% versus 23% ED cessation of resuscitation), so these patients were retained in the sample for completeness.

Limited data exist for patients receiving no resuscitation in the field. Provision of resuscitation may be biased by demographic factors unmeasured in our study. We presume these patients were most often not resuscitated because of medical futility; however, the rationale for these decisions remains undocumented and unclear. Although all patients with resuscitation ceased by EMS providers had documentation of reasons consistent with POLST orders, these reasons remain unclear for patients with no resuscitation provided and for those transported to the ED. Similarly, reasons for provision of resuscitation for patients with POLST do-not-resuscitate orders are not included, given the real-time documentation of out-of-hospital care.

Last, this study does not take into account patients who had a do-not-resuscitate order in the POLST registry, experienced out-of-hospital cardiac arrest, and never had EMS called; this outcome would be in accordance with the patient’s wishes and presumably a common occurrence. The low rate of POLST matches among the out-of-hospital cardiac arrest population likely reflects this; however, it is possible that some patients were not successfully matched to entries in the POLST registry. It is important to interpret the results of this study within the context of out-of-hospital cardiac arrest patients for whom EMS was activated.

DISCUSSION

In this study, we demonstrate that patients with a do-not-resuscitate order placed in a statewide POLST database who experience out-of-hospital cardiac arrest with EMS evaluation generally have care given in accordance with their wishes. We also show that patients with a POLST form specifying attempt resuscitation generally received resuscitation, with no incidences of misinterpretation of the POLST form documented between initiation of resuscitation and ED arrival.

There are many reasons a patient with an existing do-not-resuscitate order receives resuscitation and no criterion standard for the “correct” rate. Patients may have an unanticipated change in health status, desire temporizing measures to be taken, simply change their mind, or have family who override the specified POLST form in the midst of an acute medical event. Furthermore, families for certain patients without a POLST form may request that resuscitation be ceased. Direct communication with families and patients appropriately supersedes POLST orders. The 94% concordance rate of patients with do-not-resuscitate orders having resuscitation efforts stopped before hospital admission speaks to the success of this program, even in situations in which EMS is activated after arrest. A retrospective Oregon chart review limited to hospice patients found 98% concordance of resuscitation delivery with previous POLST documentation; however, 99% of patients in this sample had a documented do-not-resuscitate order compared with 72% in the Oregon POLST population.^{14,21} Our study demonstrates that care provided is consistent with POLST orders in a more independent and varied population. Reasons for discordance from POLST orders remain unclear from our registry-level

analysis, which warrants further exploration of resuscitation decisions and deviation from POLST orders in the out-of-hospital and ED settings.

Patients who request that resuscitation measures be attempted appear to receive interventions more extensively than the general population, although some of this effect may be related to the heterogeneity of the background group. Clinical assessment of medical futility and family wishes supersede the attempt resuscitation order as well, and the 84% concordance rate of at-scene CPR suggests that the POLST is used to guide treatment but does not serve as an absolute indicator of intervention because EMS providers retain the ability to declare futility of care. Our results suggest that the simple presence of a POLST order to attempt CPR does not erroneously lead providers to withhold resuscitation, but rather provide more aggressive measures in concordance with the patients' wishes.

Although the background group in this study is more heterogeneous in end-of-life planning than those patients with a signed attempt resuscitation order, we show that care provided to patients wanting resuscitation is appropriately aggressive and thorough. This is reassuring to older patients who have had thoughtful discussions with their providers and have decided to have thorough resuscitation attempted in the event of cardiac arrest because nearly 28% of POLST forms were found to direct management in the most recent chart review.²¹ This speaks to POLST's utility as a more nuanced approach than a simple do-not-resuscitate order. In cases with seemingly counterintuitive decisions for end-of-life care, as in one member of our sample who had selected attempt resuscitation and comfort measures only, the POLST orders remain compartmentalized in specific situations (eg, resuscitate if there is no pulse but provide comfort measures if there are signs of life), so the individually tailored orders remain actionable.

Oregon's POLST program was designed to empower patients to choose their goals of medical care at the end of life and to clearly communicate these wishes to medical providers they may encounter when emergency situations arise. As of July 2012, the statewide registry had documentation of end-of-life wishes for more than 88,000 Oregonians, a significant expansion from the 30,651 active forms at the end of 2010.²² Our data reflect the 2010 population; the 5% POLST registry match rate we found in our cohort parallels the prevalence of active POLST forms in a statewide population of 548,000 individuals aged 65 years and older, but we would expect to see higher match rates as use increases.^{23,24} Of the 11 patients with do-not-resuscitate orders who were receiving out-of-hospital resuscitation, 4 had CPR ceased after a call to the registry; this shows the capacity of the telephone database to change management but also reflects an underused system at the time of our sample collection. Calls to the central database have increased yearly, with more than 2,400 calls statewide since initiation.²⁵ The 6 calls matched to our sample represent a very small proportion of these calls but demonstrate the opportunity of improved communication to improve patient-directed care in the out-of-hospital or ED setting. Our findings demonstrate the ability of the POLST

system to guide early care during critical illness and emphasize the importance of continuing to encourage expeditious access to POLST documentation for out-of-hospital and emergency providers.

In out-of-hospital cardiac arrest events, EMS providers are challenged to make emergency treatment decisions while being mindful of patient wishes. Ideally, EMS would not be activated in the event of out-of-hospital cardiac arrest for a patient with a do-not-resuscitate order; however, this is known to happen for many reasons, even with clear knowledge of patient wishes.²⁶ On surveys, between 50% and 90% of patients in the general population express a wish to die at home; in reality, only 10% to 35% of deaths occur at home nationwide.²⁷ Part of this gap lies in the complicated logistics and emotional situations involved with home death; however, good communication with primary care providers decreases this incongruence.²⁷ Communication with providers in the out-of-hospital and ED setting in these situations is crucial to honor the wishes of patients and families, and our findings demonstrate good concordance of cardiac arrest resuscitation measures with Oregon's novel system of end-of-life decision communication. However, continued education is needed for EMS providers to access the database for any cases likely to have a preexisting POLST form and to anticipate actionable orders in emergency situations. The POLST system aims to improve patient autonomy and comfort and to decrease potentially distressing and unwanted hospitalizations.^{11,28} Calls to the Oregon POLST registry changed patient management 44% of the time in a review of 2011 telephone records.²⁹ Other states currently increasing participation in the POLST program include California, New York, Utah, Washington, and West Virginia; we recommend that the experience of EMS coordination in Oregon help inform similar registries in these states.

Our exploration of the role of POLST orders in the out-of-hospital cardiac arrest setting represents only the most medically urgent scenarios. The relatively high proportion of on-scene EMS CPR for patients with do-not-resuscitate orders demonstrates the potential for discordance when EMS is called to the scene of a patient in out-of-hospital cardiac arrest. Patients with a known do-not-resuscitate order at 911 activation may benefit from a standard non-EMS system if found after cardiac arrest because death in the field in Oregon may be managed by funeral homes, hospice services, and police without EMS involvement. Patients in arrest or needing aggressive intervention without a known do-not-resuscitate order represent the target scenario for registry access. Although our findings are limited to the out-of-hospital cardiac arrest situation, patients with other emergency presentations (ie, trauma, stroke, or confusion) may have different barriers to communication and different goals of care, warranting further investigation into the utility of the POLST program.

Our findings reinforce concordance of orders in Oregon's POLST system with care delivery. Acceptance by patients and providers of this nuanced and structured approach toward end-of-life planning has been documented.^{15,29} Although our results may alleviate concerns of misinterpretation of these orders, they

should also reinforce the need for diligent efforts to maintain and increase communication in the out-of-hospital and ED setting. Additionally, the unique nature of Oregon's statewide registry prevents us from comparing POLST with other methods of communication such as advance directives and do-not-resuscitate orders alone. Many factors both at the population and patient levels influence the utility of these systems, and further research is needed to optimize options of end-of-life communication.

In summary, we found good concordance of out-of-hospital and ED patient care with previously documented POLST orders for patients in out-of-hospital cardiac arrest. The Oregon POLST registry has the ability to improve this concordance but was underused in our sample. Further implementation of this tool should take into account potential barriers to access and continue to assess the utility of the POLST system in varied acute care situations.

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Although most committee work will be accomplished through email and conference calls, committee members are expected to attend the organizational meetings at the annual meeting in Chicago, October 27-30, 2014.

Committee interest must be submitted by May 19, 2014. If you have any questions, please contact Mary Ellen Fletcher, CPC, CEDC, at 800-798-1822, ext. 3145, or mfletcher@acep.org. Michael J. Gerardi, MD, FACEP, ACEP's President-Elect, will finalize the committee appointments in June.

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