Clinical Paper

Physician Orders for Life-Sustaining Treatment (POLST): Lessons learned from analysis of the Oregon POLST Registry

Terri A. Schmidt,a,∗ Dana Zive,b Erik K. Fromme,c Jennifer N.B. Cook,a Susan W. Tollec

a Department of Emergency Medicine, Oregon Health and Sciences University, United States
b Center for Policy and Research in Emergency Medicine, Department of Emergency Medicine, Oregon Health and Science University, United States
c Division of Hematology and Medical Oncology, Oregon Health & Science University, United States
d Center for Ethics in Health Care, Division of General Internal Medicine and Geriatrics, Oregon Health and Science University, United States

A R T I C L E   I N F O
Article history:
Received 18 June 2013
Received in revised form 18 September 2013
Accepted 3 November 2013

Keywords:
POLST
Resuscitation orders
Registries
Emergency Medical Services (EMS)
Advance care planning
Scope of treatment

A B S T R A C T
Background: Physician Orders for Life-Sustaining Treatment (POLST) has become a common means of documenting patient treatment preferences. In addition to orders either for Attempt Resuscitation or Do Not Attempt Resuscitation, for patients not in cardiopulmonary arrest, POLST provides three levels of treatment: Full Treatment, Limited Interventions, and Comfort Measures Only. Oregon has an electronic registry for POLST forms completed in the state. We used registry data to examine the different combinations of treatment orders.

Methods and results: We analyzed data from forms signed and entered into the Oregon POLST Registry in 2012. The analysis included 31,294 POLST forms. The mean Registrant age was 76.7 years. 21,396 (68.4%) had Do Not Attempt Resuscitation (DNR) orders and 9900 (31.6%) had orders for “Attempt Resuscitation”. The 6 order combinations were: Do Not Resuscitate (DNR)Comfort Measures Only 10,769 (34.4%), DNR/Limited Interventions 9306 (29.7%), DNR/Full Treatment 1211 (3.9%), Attempt Cardiopulmonary Resuscitation (CPR)/Comfort Measures Only 11 (0.04%), Attempt CPR/Limited Interventions 2281 (7.3%), and Attempt CPR/Full Treatment 7473 (23.9%).

Conclusions: The most common order combinations were DNR/Comfort Measures Only, DNR/Limited Interventions and Attempt Resuscitation/Full Treatment. These three makes sense to health professionals. However, other order combinations that require interpretation at the time of a crisis were completed for about 10% of Registrants. These combinations need further investigation.

© 2013 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

Advance directives are useful in helping patients designate a health care representative to speak on their behalf if they are not able, and help patients and families, discuss and document the care they want near the end of their lives. However, advance directives (ADs) are frequently not available when patients transition to a hospital, and even when available, they do not provide orders that first responders can follow. Studies have not supported their effectiveness. The SUPPORT Trial which enrolled patients at five teaching hospitals in the United States did not show that having an AD improved outcome.

Several recent studies find no association between the presence of an AD and use of life sustaining treatments. Mirarchi reports that ADs may be misinterpreted and some patients do not receive treatments they would want because of their presence.

One approach to honoring patient preferences near the end of life is an out-of-hospital Do Not Resuscitate (DNR) order. DNR orders take effect when a person is in cardiopulmonary arrest but do not address what to do in the critical period before cardiopulmonary arrest when important care decisions arise.

In the early 1990s health professionals in Oregon from emergency medicine, long term care and ethics came together and developed the Physician Orders for Life-Sustaining Treatment (POLST) program to address some of the shortcomings of ADs and out-of-hospital DNR orders for patients with advanced, incurable illnesses or frailty. POLST is not for everyone but is designed for patients who are likely to die within the next year. POLST has spread to other states and in 2004 the National POLST Paradigm Taskforce was convened. As of August 2013 the Taskforce has endorsed POLST paradigm programs in 15 states and programs are under development many other states. A study of emergency
medical technicians (EMTs) experience of POLST found that when present POLST orders often changed the treatment provided and that EMTs found it useful. Similarly, studies have shown its effectiveness in long-term care facilities, hospice and other settings. A study in Wisconsin showed how it can be effective across a community.

POLST translates end-of-life care preferences into out-of-hospital medical orders based on a person's current health condition. Physicians and, in some states, physician assistants and nurse practitioners, complete the POLST form after a discussion with the patient or authorized surrogate. POLST orders are valid in any setting and can be followed by EMTs, physicians, long term care staff, and other health professionals. Like an out-of-hospital DNR order, POLST provides orders regarding cardiopulmonary resuscitation if the patient is pulseless and apnoeic (Section A, Fig. 1). POLST scopes of treatment orders (Section B, Fig. 1) go further to include other crisis situations when patients are not in cardiopulmonary arrest.
POLST scope of treatment orders specify three levels of treatment reflecting a patient’s goals of care: Full Treatment including admission to the intensive care unit (ICU) and ventilator support; Limited Interventions meaning medical treatment and hospitalization for potentially reversible medical problems but not intubation, ventilator support and generally avoiding ICU admission; or Comfort Measures Only meaning treatments whose primary purpose is to maximize comfort through symptom management. Patients with Comfort Measures Only orders are hospitalized only if comfort needs cannot be met in the current care setting. By combining POLST scope of treatment orders with orders regarding resuscitation, POLST forms allow many different order combinations based on patient preferences.

In Oregon, the POLST form is given to the patient and submitted to the Oregon POLST Registry unless a patient opts out. Created by the Oregon legislature in 2009, the Registry works to make POLST orders accessible to emergency health professionals through a 24/7 call center and has been in operation since December 3, 2009. The Center for Ethics in Health Care at Oregon Health and Sciences University has done extensive education for health professionals about the mandate to submit signed forms to the Registry.

A study analyzing POLST forms from the first year of Registry operations, found that of patients who had DNR orders recorded in Section A, only half had orders for Comfort Measures Only. Knowing the answer to the “code question” did not determine the patient’s goals of care and treatment preferences when the patient is not in cardiopulmonary arrest. The purpose of this study is to describe the combinations of orders recorded in POLST Sections A and B (CPR and Scope of Treatment) using Oregon’s population data from the Registry in order to better understand and interpret those orders at the time of a crisis.

2. Methods

2.1. Study design

We analyzed data from Sections A and B from all 31,294 POLST forms signed and entered into the Registry between January 1 and December 31, 2012. Forms signed prior to January 1, 2012 but received during the timeframe were excluded from this study. We excluded Section C orders regarding use of artificial nutrition because we were interested in the time period from an out-of-hospital acute event through transition to an in-patient setting. The 2012 time period was chosen because the Registry had been in existence long enough to allow health professionals to be educated about the mandate thus suggesting this sample represents the majority of Oregon POLST forms completed during the time period.

If a Registrant had more than one form in the Registry, only the most recent form was used, excluding 2809 forms. Race, ethnicity and medical conditions are not recorded on the forms. Registrants were categorized into “urban” and “rural” using Metropolitan Statistical Areas at the zip code level. The Oregon Health and Sciences University Institutional Review Board and the Oregon Public Health Institutional Review Board approved the study.

2.2. Statistical analysis

Univariate (chi-square and t-test) and multivariate logistic regression were used to identify associations between demographic variables and POLST form orders. The logistic regression models included variables found to be statistically different in univariate analysis (p < 0.05). Dependent variables were binary form orders or binary form order combinations (1 = Order(s) documented). All analyses were completed using SPSS v21 (IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.).

3. Results

The analysis included 31,294 forms. Mean age of Registrants at the time the form was signed was 76.7 years (range 0–109 years) and 57.5% were female (39.8% male and 2.7% unknown). See Fig. 2. The sample includes forms from every county in Oregon.

In Section A, 21,394 Registrants (68.4%) had DNR orders and 9900 (31.6%) had Attempt Resuscitation. In Section B, 8684 (27.7%) had Full Treatment orders, 11,587 (37.0%) Limited Interventions and 10,780 (34.4%) Comfort Measures Only. See Table 1 for the number and percent of forms with each of the six Sections A and B treatment combinations.

In univariate analysis, gender differences were noted in Section A with 34.3% of forms for males indicating “Attempt Resuscitation” vs. 29.8% for females (p < 0.01). The mean age of Registrants
with orders indicating DNR was 79.6 years vs. 70.4 years for those with Attempt Resuscitation (p<0.01). The majority of Registrants (77.3%) were categorized into “Urban” and “Rural”. Urban Registrants were more likely to have orders indicating Attempt Resuscitation and Full Treatment as compared to rural Registrants (23.8% vs. 22.8%, p = 0.04), as well as the combination of DNR with Full Treatment (4.3% vs. 3.2%, p < 0.01), while rural Registrants were more likely to select CPR and Limited Interventions (8.2% vs. 6.8%, p < 0.01).

In logistic regression analysis using age, gender, and urban/rural residence address, being either older or female increase the odds of having a DNR order. For Section B, older age or rural location decrease the odds of having Full Treatment orders. When considering section combinations, older age increases the odds of DNR/Comfort Measures and DNR/Limited Interventions while decreasing the odds of DNR/Full Treatment. See Table 2 for full results.

4. Discussion

The Oregon POLST Registry has provided the first opportunity to study the treatment preferences documented in POLST orders for the population of an entire state. There have been studies of POLST use in settings such as nursing homes, hospice programs and at the individual county level.\cite{13,15,17–19,21} However, none of these studies were population-based or across care settings, so no prior study has assessed the diversity of treatment orders. Because legislation creating the Registry included a mandate for health professionals to submit forms, this sample is likely representative of the general population of POLST-appropriate patients in Oregon. Forms in this sample were received from every Oregon County, though the population proportion with forms in the Registry varies by county. Most forms were completed for people over 60 years old, the population most likely to have serious, chronic illness. However, all age groups are represented including 63 people under the age of 21 years. As expected, given that US women have a longer life expectancy than men,\cite{27} more women had POLST forms in the Registry.

POLST is not about limits on treatment. It is a method of recording and honoring patients’ preferences regarding life-sustaining interventions such as intubation, mechanical ventilation, hospital admission or ICU admission. Nearly one third of people in this study had orders to attempt resuscitation despite that being the default treatment. For those forms with DNR orders, 50.3% had Comfort Measures Only, while 43.5% had Limited Interventions and 5.7% had Full Treatment, reinforcing that a wide range of treatment preferences are being documented.

We used a multiple regression model to determine the association, if any, between age, gender and likelihood of having specific POLST orders. Older age increased the likelihood of the patient choosing DNR orders and Comfort Measures Only or Limited Interventions. Generally, being older lead to a preference for more limitations on treatment. Age may be a surrogate for more serious health status and closer proximity to the end of life. Women were also more likely to have DNR orders independent of age. We do not know the reasons for this difference but speculate that more women than men live in long term care facilities and men are more likely to have care givers at home, thus men may tend to complete a POLST form closer to the time of death when they are sicker. However, these increased odds ratios were small and explain little of the variation in orders. Current health status and disease burden, which we were unable to measure, are likely more important determinants.

5. Interpreting POLST orders

There are 6 possible order combinations in Sections A and B of the Oregon and most other POLST Paradigm forms. We found that all 6 were represented.

Some combinations are easy to interpret and implement such as Attempt Resuscitation and Full Treatment directing no limits on medical interventions. This treatment combination was found on 23.9% of forms. Of course, this is not an indication of the percent of the population who would want Attempt Resuscitation and Full Treatment as this is equal to the standard of care if no POLST exists regardless of a patients’ medical condition.

Although this is the default treatment, some patients and their health professionals use the POLST to document that they had a thoughtful discussion prior to an acute crisis and determined they

### Table 1

<table>
<thead>
<tr>
<th>Combination</th>
<th>n</th>
<th>% of forms (order combination/total forms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNR/Comfort Measures Only</td>
<td>10,769</td>
<td>34.4</td>
</tr>
<tr>
<td>DNR/Limited Interventions</td>
<td>9306</td>
<td>29.7</td>
</tr>
<tr>
<td>DNR/Full Treatment</td>
<td>1211</td>
<td>3.9</td>
</tr>
<tr>
<td>Attempt Resuscitation/Comfort Measures Only</td>
<td>11</td>
<td>0.04</td>
</tr>
<tr>
<td>Attempt Resuscitation/Limited Interventions</td>
<td>2281</td>
<td>7.3</td>
</tr>
<tr>
<td>Attempt Resuscitation/Full Treatment</td>
<td>7473</td>
<td>23.9</td>
</tr>
<tr>
<td>Total</td>
<td>31,051</td>
<td>99.2</td>
</tr>
</tbody>
</table>

243 forms were excluded because Section B was not completed so number does not add up to 100%.

* Disallowed in the Registry in May 2012.

### Table 2

<table>
<thead>
<tr>
<th>Order/Combination</th>
<th>Increasing age OR (95% CI)</th>
<th>Female OR (95% CI)</th>
<th>Rural OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNR: Section A</td>
<td>1.059 (1.056–1.061)</td>
<td>1.064 (1.004–1.129)</td>
<td>0.959 (0.903–1.017)</td>
</tr>
<tr>
<td>Comfort Measures Only: Section B</td>
<td>1.032 (1.030–1.035)</td>
<td>0.929 (0.879–0.981)</td>
<td>1.037 (0.981–1.096)</td>
</tr>
<tr>
<td>Full Treatment: Section B</td>
<td>0.942 (0.940–0.945)</td>
<td>0.961 (0.904–1.022)</td>
<td>0.891 (0.837–0.949)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order Combination</th>
<th>Increasing Age</th>
<th>Female</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNR/Comfort Measures Only</td>
<td>1.032 (1.030–1.035)</td>
<td>0.929 (0.879–0.981)</td>
<td>1.037 (0.981–1.096)</td>
</tr>
<tr>
<td>DNR/Limited Interventions</td>
<td>1.030 (1.027–1.032)</td>
<td>1.132 (1.068–1.200)</td>
<td>0.984 (0.928–1.044)</td>
</tr>
<tr>
<td>DNR/Full Treatment</td>
<td>0.988 (0.983–0.992)</td>
<td>1.063 (0.929–1.216)</td>
<td>0.746 (0.647–0.860)</td>
</tr>
<tr>
<td>Attempt Resuscitation/Comfort Measures Only</td>
<td>1.018 (0.965–1.075)</td>
<td>0.971 (0.927–3.463)</td>
<td>1.151 (0.324–4.083)</td>
</tr>
<tr>
<td>Attempt Resuscitation/Limited Interventions</td>
<td>0.993 (0.985–0.997)</td>
<td>0.960 (0.869–1.060)</td>
<td>1.232 (1.116–1.360)</td>
</tr>
<tr>
<td>Attempt Resuscitation/Full Treatment</td>
<td>0.940 (0.938–0.943)</td>
<td>0.942 (0.883–1.004)</td>
<td>0.945 (0.884–1.009)</td>
</tr>
</tbody>
</table>

Bold indicates significant values.

* Disallowed in Registry in May 2012.
want full treatment. In addition, many long term care facilities in Oregon offer the opportunity to complete a POLST to all residents, so they know how to respond before a crisis happens. Having a POLST documenting treatment preferences may avoid the jarring question in the midst of a crisis, “If your heart stops, do you want us to do everything?” If the first discussion about goals of care is during a crisis many may not be prepared to say “no”. Patients and families may fear that the alternative to everything is nothing and assume that health professionals would not offer something that has no benefit. Who decides what “everything” means when different individuals can mean drastically different things?28

DNR and Comfort Measures Only, the most common order combination in the Registry (34.4% of forms), also makes sense. These patients do not want any interventions intended to extend life but may need transport and hospital admission if comfort cannot be provided in their current setting. The goal is to maximize comfort. Once in the emergency department, decisions about hospital admission should be based on the ability to meet comfort needs outside the hospital. For example, a patient with a hip fracture may need admission and even surgery to meet comfort needs while another patient who is determined to have sustained an intracranial bleed may be discharged back to a care facility if they can meet the patient’s comfort needs.

The second most common order combination in the Registry is DNR and Limited Interventions. In general, these patients want to avoid ICU admission, would not want mechanical ventilation, but do want basic medical treatments such as fluid administration for dehydration or antibiotics for an infection. While they usually avoid ICU admission, there may be individual situations where the patient or family agrees that a brief ICU stay is warranted.

A small number of forms (3.9%) had orders for DNR and Full Treatment. Patients are expressing their desire to have all possible life-prolonging interventions including mechanical ventilation until their heart stops but no cardiopulmonary resuscitation (CPR) attempt. This order combination is medically feasible and may make sense given the low survival rate from out-of-hospital arrest in this population. In an early study from King County, Washington, patients with severe chronic disease and unwanted resuscitation comprised one-third of all Emergency Medical Services (EMS) resuscitation attempts. Overall survival from out-of-hospital cardiac arrest in that study was 16% as compared to 2% in those with severe chronic illness and unwanted resuscitation.29 This is in the context of a 2008 study comparing survival in 10 cities including Seattle that found survival to hospital discharge after out-of-hospital cardiac arrest ranged from 3.0% to 16.3%, with a median of 8.4%.30 In contrast, the rate of survival to hospital discharge for in-hospital arrest is higher at 19%31 and for patients over age 65 who survive an in-hospital cardiac arrest to discharge, one year later 58.5% were still alive, and 34.4% had not been readmitted to the hospital.32

Of the 9900 forms in the sample with orders to Attempt Resuscitation, 11 (0.1%) indicated Comfort Measures Only. This order combination is neither medically feasible nor logically consistent. How can you make no efforts to prolong life up to the point of cardiopulmonary arrest and then begin resuscitation only to stop and return to comfort care if you obtain a pulse? Therefore, the Registry no longer accepts forms with this order combination and the signing health professional is alerted to the inconsistency. Health professionals should clarify their patients’ goals of care when these orders are requested so treatment wishes are correctly recorded and actionable. Health systems developing an electronic POLST completion mechanism might consider preventing completion of a form with a medically incompatible order combination.

A more complex question is how to respond to the order combination of Attempt Resuscitation and Limited Interventions. This order combination was more common than expected (7.3% of forms). Limited Interventions excludes intubation and mechanical ventilation. Clinically, attempted resuscitation includes intubation and mechanical ventilation unless defibrillation leads to rapid return of spontaneous circulation. In the out-of-hospital setting this best case scenario might occur in bystander-witnessed arrest with ventricular defibrillation where reported survival rate is 28%.

How should these orders be interpreted? In a patient with severe respiratory distress, do health professionals standly unless cardiac arrest occurs because the patient did not want intubation and mechanical ventilation and then start CPR? Conversely, if responders find a person in cardiac arrest, do they begin CPR but not intubate?

In the authors’ personal experience speaking with patients and their primary care providers we have heard that for many of them, the message they are trying to convey is that if they had a cardiac arrest, they would want an attempt at resuscitation in the hope that it would be quickly successful but if the outcome was being in the ICU on a ventilator they would not want to be maintained on life support. Given the low survival rate for seriously ill patients with out-of-hospital cardiac arrest, this treatment choice is unlikely to be successful.

States that are developing POLST forms or electronic registries will need to determine whether or not to allow this order combination. Currently, some states such as Oregon accept this combination in their Registry and other states such as West Virginia and California do not. In revising POLST paradigm forms it is also possible that there is a need for a third Section A treatment choice that would allow a brief period of CPR and use of an Automated External Defibrillator (AED)/electrical defibrillation only.

6. Limitations

Although a mandate exists to submit forms to the Registry, it is unknown how many forms are not submitted or how many patients opt out of the Registry. There has been an extensive education campaign to make health professionals aware of the Registry and the number of forms submitted has been consistent at about 3500/month. Forms are received from clinics, long term care facilities, hospice programs, individuals, and health systems throughout the state. Registry demographics are limited to age, gender and address (see Fig. 1). Finally, the Registry provides information from one state and may not be generalizable to other populations.

7. Conclusions

Based on this review of POLST forms signed and submitted in 2012 to a statewide registry, there was wide variation in the combinations of life-sustaining treatment orders. About one-third of Registrants had orders to Attempt Resuscitation, one-third had DNR and Comfort Measures Only and the remaining third had DNR with either Limited Interventions or Full Treatment. The most common combinations were DNR/Comfort Measures Only, DNR/Limited Interventions and Attempt Resuscitation/Full Treatment. These 3 order combinations are relatively straightforward and most health professionals can interpret them. The Registry includes some order combinations that are more complicated to interpret. Systems need to determine what the patient intended, whether or not some combinations are feasible, and individual clinicians need to explore how to interpret them at the time of a crisis.

Conflict of interest statement

The authors wish to disclose that the Oregon POLST Registry is operated within the OHSU Department of Emergency Medicine.
under contract with the State of Oregon. Authors Schmidt T, Zive D, and Cook J received salary support for Registry operations, but not for research activities. Authors Fromme E, Zive D, and Cook J received research support through a grant from Samuel S. Johnson Foundation, during the conduct of the study; Fromme E. and Zive D. report travel support from the Oregon POLST Program, Center for Ethics in Health Care at OHSU; and grants from the California Coalition for Compassionate Care. Susan Tolle received support for her national leadership of the POLST Program from the Retirement Research Foundation, the California HealthCare Foundation and the Archstone Foundation. Cook J. received personal fees from Continuing Medical Education of Southern Oregon, and from Washington County EMS, outside the submitted work.

Funding sources

Financial support for this project was provided by the Samuel S. Johnson Foundation.

References