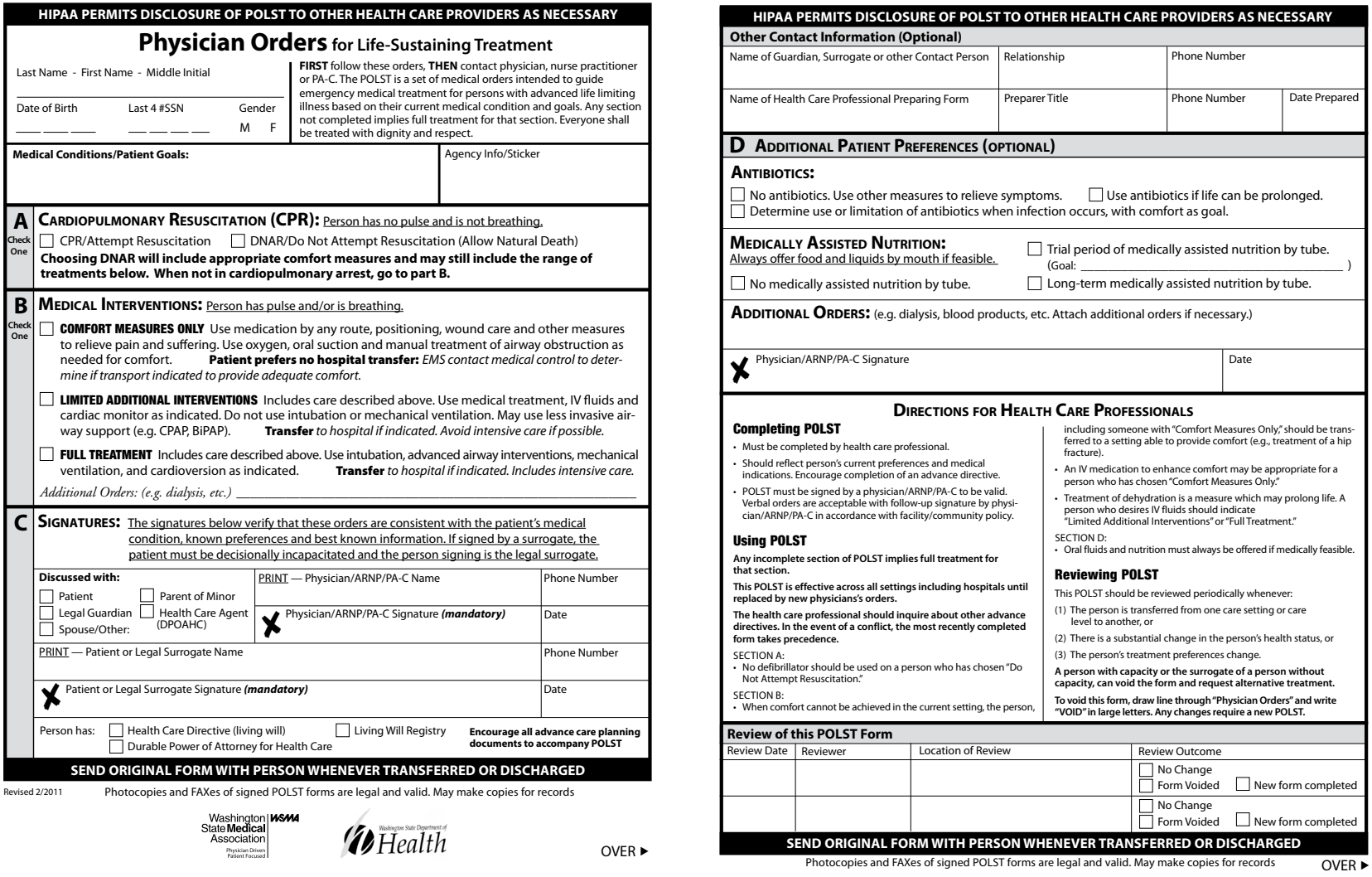
Supplementary Online Content

Lee RY, Brumback LC, Sathitratanacheewin S, et al. Association of Physician Orders for Life-Sustaining Treatment with ICU admission among patients hospitalized near the end of life. *JAMA*. doi:10.1001/jama.2019.22523

This supplementary material was provided by the authors to give readers additional information about their work.

eFigure 1. Washington State POLST Form (February 2011 revision).



HIPAA PERMITS DISCLOSURE OF POLST TO OTHER HEALTH CARE PROVIDERS AS NECESSARY

Physician Orders for Life-Sustaining Treatment

Last Name - First Name - Middle Initial

Date of Birth ___ ___ ___ Last 4 #SSN ___ ___ ___ ___ Gender M F

FIRST follow these orders, **THEN** contact physician, nurse practitioner or PA-C. The POLST is a set of medical orders intended to guide emergency medical treatment for persons with advanced life limiting illness based on their current medical condition and goals. Any section not completed implies full treatment for that section. Everyone shall be treated with dignity and respect.

Medical Conditions/Patient Goals:

Agency Info/Sticker

A Check One — **CARDIOPULMONARY RESUSCITATION (CPR):** Person has no pulse and is not breathing.

☐ CPR/Attempt Resuscitation ☐ DNAR/Do Not Attempt Resuscitation (Allow Natural Death)

Choosing DNAR will include appropriate comfort measures and may still include the range of treatments below. When not in cardiopulmonary arrest, go to part B.

B Check One — **MEDICAL INTERVENTIONS:** Person has pulse and/or is breathing.

☐ **COMFORT MEASURES ONLY** Use medication by any route, positioning, wound care and other measures to relieve pain and suffering. Use oxygen, oral suction and manual treatment of airway obstruction as needed for comfort. **Patient prefers no hospital transfer:** *EMS contact medical control to determine if transport indicated to provide adequate comfort.*

☐ **LIMITED ADDITIONAL INTERVENTIONS** Includes care described above. Use medical treatment, IV fluids and cardiac monitor as indicated. Do not use intubation or mechanical ventilation. May use less invasive airway support (e.g. CPAP, BiPAP). **Transfer** *to hospital if indicated. Avoid intensive care if possible.*

☐ **FULL TREATMENT** Includes care described above. Use intubation, advanced airway interventions, mechanical ventilation, and cardioversion as indicated. **Transfer** *to hospital if indicated. Includes intensive care.*

Additional Orders: (e.g. dialysis, etc.) _____

C **SIGNATURES:** The signatures below verify that these orders are consistent with the patient's medical condition, known preferences and best known information. If signed by a surrogate, the patient must be decisionally incapacitated and the person signing is the legal surrogate.

Discussed with: ☐ Patient ☐ Parent of Minor ☐ Legal Guardian ☐ Health Care Agent (DPOAHC) ☐ Spouse/Other:

PRINT — Physician/ARNP/PA-C Name | Phone Number

✗ Physician/ARNP/PA-C Signature ***(mandatory)*** | Date

PRINT — Patient or Legal Surrogate Name | Phone Number

✗ Patient or Legal Surrogate Signature ***(mandatory)*** | Date

Person has: ☐ Health Care Directive (living will) ☐ Living Will Registry ☐ Durable Power of Attorney for Health Care

Encourage all advance care planning documents to accompany POLST

SEND ORIGINAL FORM WITH PERSON WHENEVER TRANSFERRED OR DISCHARGED

Revised 2/2011 Photocopies and FAXes of signed POLST forms are legal and valid. May make copies for records

Washington State Medical Association WSMA Physician Driven Patient Focused

Washington State Department of Health

OVER ►

HIPAA PERMITS DISCLOSURE OF POLST TO OTHER HEALTH CARE PROVIDERS AS NECESSARY

Other Contact Information (Optional)

Name of Guardian, Surrogate or other Contact Person	Relationship	Phone Number	
Name of Health Care Professional Preparing Form	Preparer Title	Phone Number	Date Prepared

D ADDITIONAL PATIENT PREFERENCES (OPTIONAL)

ANTIBIOTICS:

☐ No antibiotics. Use other measures to relieve symptoms. ☐ Use antibiotics if life can be prolonged.

☐ Determine use or limitation of antibiotics when infection occurs, with comfort as goal.

MEDICALLY ASSISTED NUTRITION: Always offer food and liquids by mouth if feasible.

☐ Trial period of medically assisted nutrition by tube. (Goal: _____)

☐ No medically assisted nutrition by tube. ☐ Long-term medically assisted nutrition by tube.

ADDITIONAL ORDERS: (e.g. dialysis, blood products, etc. Attach additional orders if necessary.)

✗ Physician/ARNP/PA-C Signature | Date

DIRECTIONS FOR HEALTH CARE PROFESSIONALS

Completing POLST

- Must be completed by health care professional.
- Should reflect person's current preferences and medical indications. Encourage completion of an advance directive.
- POLST must be signed by a physician/ARNP/PA-C to be valid. Verbal orders are acceptable with follow-up signature by physician/ARNP/PA-C in accordance with facility/community policy.

Using POLST

Any incomplete section of POLST implies full treatment for that section.

This POLST is effective across all settings including hospitals until replaced by new physicians's orders.

The health care professional should inquire about other advance directives. In the event of a conflict, the most recently completed form takes precedence.

SECTION A:
- No defibrillator should be used on a person who has chosen "Do Not Attempt Resuscitation."

SECTION B:
- When comfort cannot be achieved in the current setting, the person, including someone with "Comfort Measures Only," should be transferred to a setting able to provide comfort (e.g., treatment of a hip fracture).
- An IV medication to enhance comfort may be appropriate for a person who has chosen "Comfort Measures Only."
- Treatment of dehydration is a measure which may prolong life. A person who desires IV fluids should indicate "Limited Additional Interventions" or "Full Treatment."

SECTION D:
- Oral fluids and nutrition must always be offered if medically feasible.

Reviewing POLST

This POLST should be reviewed periodically whenever:

(1) The person is transferred from one care setting or care level to another, or

(2) There is a substantial change in the person's health status, or

(3) The person's treatment preferences change.

A person with capacity or the surrogate of a person without capacity, can void the form and request alternative treatment.

To void this form, draw line through "Physician Orders" and write "VOID" in large letters. Any changes require a new POLST.

Review of this POLST Form

Review Date	Reviewer	Location of Review	Review Outcome
			☐ No Change ☐ Form Voided ☐ New form completed
			☐ No Change ☐ Form Voided ☐ New form completed

SEND ORIGINAL FORM WITH PERSON WHENEVER TRANSFERRED OR DISCHARGED

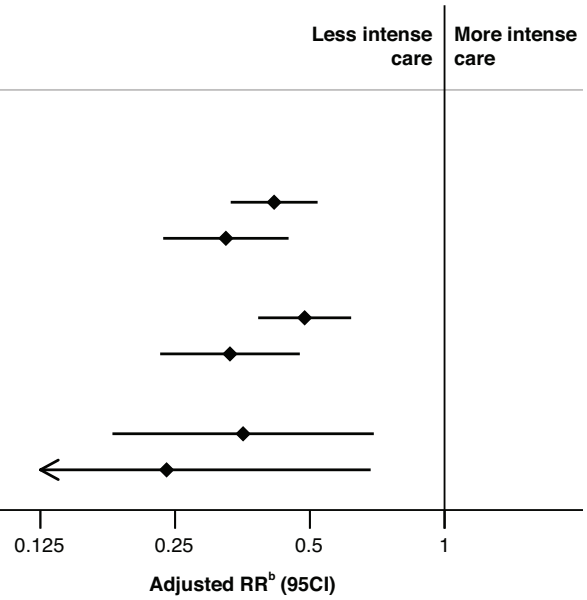
Photocopies and FAXes of signed POLST forms are legal and valid. May make copies for records

OVER ►

This is the most common version of the Washington State POLST encountered in the study. Minor differences in language are present across the revision history of the Washington State POLST. The most current version is available at https://wsma.org/POLST/. Reproduced with permission from the Washington State Medical Association.

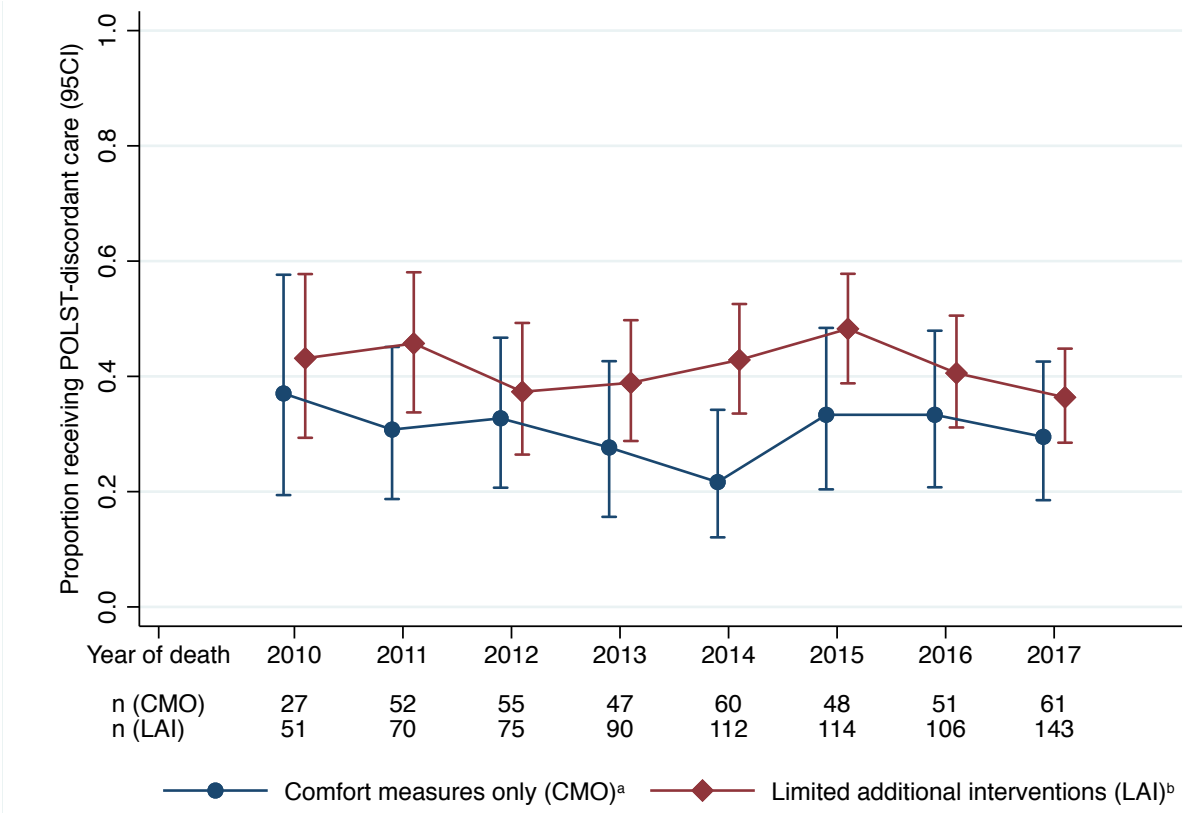
eFigure 2. Associations Between POLST Order for Medical Interventions and Individual Life-Sustaining Treatments Near the End of Life. [a]

POLST Order for Medical Interventions	n/N	Unadj. RR (95CI)	p	Adj. RR[b] (95CI)	p
Individual Life-Sustaining Treatments					
Mechanical Ventilation, compared to those with Full Treatment POLST (n/N = 237/656)					
Limited Additional Interventions	94/761	0.34 (0.28, 0.42)	< 0.001	0.42 (0.33, 0.52)	< 0.001
Comfort Measures Only	38/401	0.26 (0.19, 0.36)	< 0.001	0.32 (0.24, 0.45)	< 0.001
Vasoactive Infusions, compared to those with Full Treatment POLST (n/N = 182/656)					
Limited Additional Interventions	91/761	0.43 (0.34, 0.54)	< 0.001	0.49 (0.38, 0.62)	< 0.001
Comfort Measures Only	32/401	0.29 (0.20, 0.41)	< 0.001	0.33 (0.23, 0.47)	< 0.001
CPR, compared to those with Full Treatment POLST (n/N = 37/656)					
Limited Additional Interventions	12/761	0.28 (0.15, 0.53)	< 0.001	0.35 (0.18, 0.69)	0.003
Comfort Measures Only	4/401	0.18 (0.06, 0.49)	0.001	0.24 (0.08, 0.68)	0.008



Plot shows estimated adjusted risk ratios and 95%CI. Abbreviations: POLST, Physician Orders for Life-Sustaining Treatment; n/N, unadjusted risk.
[a] Analysis not performed for outcome of new dialysis or continuous renal replacement therapy (CRRT) due to small cell counts.
[b] Adjusted for age at admission, race/ethnicity, education, log-transformed days from POLST completion to study admission, history of cancer with poor prognosis, history of dementia, and whether patient signed own POLST.

eFigure 3. Incidence of POLST-Discordant Intensive Care by Year of Death.

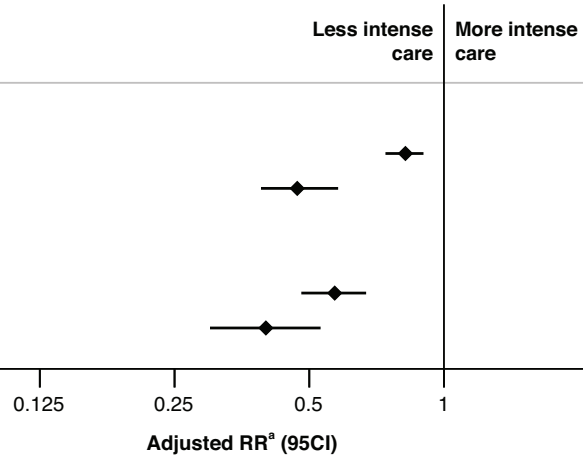


Plot shows estimates and 95%CI of incidence of POLST-discordant care by year of death, separated by POLST order for medical interventions. Abbreviations: POLST, Physician Orders for Life-Sustaining Treatment; CMO, comfort measures only; LAI, limited additional interventions.

Unadjusted and adjusted associations between date of death (modeled as a continuous variable) and POLST-discordant care:
[a] Comfort Only: Unadj. RR 0.99 per year, 95%CI 0.92-1.05, p=0.68; adj. RR[c] 1.01 per year, 95%CI 0.94-1.09, p=0.70.
[b] Limited Interventions: Unadj. RR 0.99 per year, 95%CI 0.95-1.02, p=0.46; adj. RR[c] 1.00 per year, 95%CI 0.96-1.04, p=0.90.
[c] Adjusted for age at admission, race/ethnicity, education, log-transformed days from POLST completion to study admission, history of cancer with poor prognosis, history of dementia, admission for traumatic injury, and whether patient signed own POLST.

eFigure 4. Associations Between POLST Order for Medical Interventions and Intensive Care Near the End of Life Among Patients who Died During the Study Hospitalization.

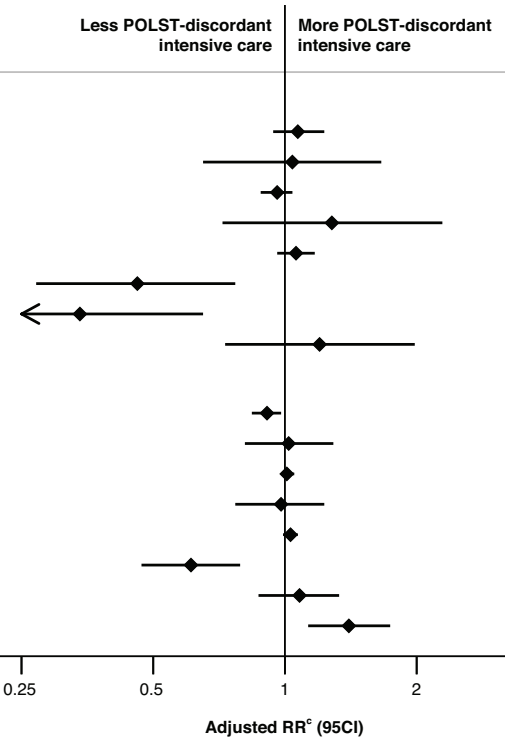
POLST Order for Medical Interventions	n/N	Unadj. RR (95CI)	p	Adj. RR[a] (95CI)	p
Primary Outcome: Admission to ICU, compared to those with Full Treatment POLST (n/N = 241/277)					
Limited Additional Interventions	190/281	0.78 (0.71, 0.85)	< 0.001	0.82 (0.74, 0.90)	< 0.001
Comfort Measures Only	56/142	0.45 (0.37, 0.56)	< 0.001	0.47 (0.39, 0.58)	< 0.001
Secondary Outcome: Life–Sustaining Treatments, compared to those with Full Treatment POLST (n/N = 201/277)					
Limited Additional Interventions	106/281	0.52 (0.44, 0.61)	< 0.001	0.57 (0.48, 0.67)	< 0.001
Comfort Measures Only	37/142	0.36 (0.27, 0.48)	< 0.001	0.40 (0.30, 0.53)	< 0.001



Plot shows estimated adjusted risk ratios and 95%CI. Abbreviations: POLST, Physician Orders for Life-Sustaining Treatment; n/N, unadjusted risk.
[a] Adjusted for age at admission, race/ethnicity, education, log-transformed days from POLST completion to study admission, history of cancer with poor prognosis, history of dementia, and whether patient signed own POLST.

eFigure 5. Associations Between Patient Characteristics and POLST-Discordant Intensive Care Among Patients who Died During the Study Hospitalization.

Characteristic	Unadj. Risk (n/N)[a] Exposed	Unexposed	Unadj. RR[b] (95CI)	p	Adj. RR[c] (95CI)	p
Comfort Measures Only (N=142 of 401 decedents)						
Age at admission, per 10 years			1.06 (0.92, 1.21)	0.43	1.07 (0.94, 1.23)	0.30
Non−white race or Hispanic ethnicity	13/31	40/102	1.05 (0.64, 1.72)	0.85	1.04 (0.65, 1.66)	0.88
Educational attainment [d]			0.95 (0.87, 1.03)	0.23	0.96 (0.88, 1.04)	0.27
Patient signed own POLST [e]	39/91	9/32	1.54 (0.85, 2.81)	0.15	1.28 (0.72, 2.29)	0.41
Log−days from POLST to admission [f]			1.10 (1.00, 1.20)	0.05	1.06 (0.96, 1.17)	0.23
History of cancer with poor prognosis	15/63	40/79	0.47 (0.29, 0.77)	< 0.001	0.46 (0.27, 0.77)	< 0.001
History of dementia	8/37	47/105	0.48 (0.25, 0.93)	0.03	0.34 (0.18, 0.65)	< 0.001
Admitted for traumatic injury	10/22	45/120	1.21 (0.72, 2.03)	0.46	1.20 (0.73, 1.98)	0.46
Limited Additional Interventions (N=281 of 761 decedents)						
Age at admission, per 10 years			1.00 (0.93, 1.07)	0.96	0.91 (0.84, 0.98)	0.01
Non−white race or Hispanic ethnicity	39/71	106/186	0.97 (0.77, 1.23)	0.83	1.02 (0.81, 1.29)	0.85
Educational attainment [d]			1.00 (0.96, 1.04)	0.98	1.01 (0.98, 1.05)	0.46
Patient signed own POLST [e]	103/177	43/68	0.92 (0.74, 1.15)	0.46	0.98 (0.77, 1.23)	0.84
Log−days from POLST to admission [f]			1.04 (1.00, 1.09)	0.04	1.03 (0.99, 1.07)	0.12
History of cancer with poor prognosis	47/112	118/169	0.60 (0.47, 0.76)	< 0.001	0.61 (0.47, 0.79)	< 0.001
History of dementia	54/79	111/202	1.24 (1.02, 1.51)	0.03	1.08 (0.87, 1.33)	0.50
Admitted for traumatic injury	28/34	137/247	1.48 (1.23, 1.80)	< 0.001	1.40 (1.13, 1.74)	< 0.001



Plot shows estimated adjusted risk ratios and 95%CI. Abbreviations: POLST, Physician Orders for Life-Sustaining Treatment.
[a] Complete cases only. Omitted for continuous exposures.
[b] Unadjusted relative risk with multiple imputation of missing data.
[c] Adjusted for all exposures presented in the figure, separated by POLST order for medical interventions.
[d] Relative risk per year of formal education.
[e] The Washington State POLST specifies that the POLST should always be signed by the patient, unless the patient is “decisionally incapacitated” in which case a legal surrogate may sign the POLST.
[f] Relative risk per doubling of days from POLST signature to date of admission (i.e. log base 2).

eTable 1. Summary of Missing Covariates by POLST Order for Medical Interventions. [a]

	POLST Order for Medical Interventions		
	Comfort Measures Only (n=401)	**Limited Additional Interventions (n=761)**	**Full Treatment (n=656)**
Characteristic	*n complete (%)*	*n complete (%)*	*n complete (%)*
Non-white race or Hispanic ethnicity	386 (96)	725 (95)	622 (95)
Educational attainment	365 (91)	701 (92)	591 (90)
Patient signed own POLST [b]	353 (88)	655 (86)	549 (84)

Abbreviations: POLST, Physician Orders for Life-Sustaining Treatment.

[a] Data for POLST order for medical interventions, age at admission, days from POLST to admission, history of cancer, history of dementia, admitting diagnosis of traumatic injury, ICU admission, and receipt of life-sustaining treatments (mechanical ventilation, vasoactive infusions, new dialysis or CRRT, and CPR) were complete for all patients.

[b] POLSTs with no printed signatory name and an illegible signature were treated as having missing data for POLST signatory.

eTable 2. Hospital Admissions Among POLST Users Near the End of Life. [a]

Characteristic	POLST Order for Medical Interventions	
	Comfort Measures Only (n=401)	Limited Interventions (n=761)
Characteristics at the Time of Study Hospitalization		
Admitted from a nursing facility, n (%) [b]	126 (31)	284 (32)
Primary admitting diagnosis, n (%)		
Cancer [c]	100 (25)	181 (24)
Traumatic injury	64 (16)	91 (12)
Pneumonia or respiratory failure [d]	51 (13)	94 (12)
Non-pulmonary sepsis or infection	51 (13)	120 (16)
Stroke	20 (5)	60 (8)
CHF exacerbation	14 (3)	52 (7)
Myocardial infarction	11 (3)	18 (2)
COPD exacerbation	10 (2)	11 (1)
Decompensated cirrhosis	9 (2)	14 (2)
Renal failure	7 (2)	8 (1)
Gastrointestinal bleeding [e]	4 (1)	12 (2)
Other [f]	60 (15)	100 (13)
Outcomes Following Study Hospitalization		
Place of death, n (%) [g]		
Died in study hospital	142 (37)	281 (38)
Died in a nursing facility	124 (32)	210 (28)
Died at home	83 (22)	171 (23)
Died in a hospice facility	17 (4)	21 (3)
Died in a non-study hospital, n (%) [h]	19 (5)	58 (8)
Time of death		
Died during study hospitalization, n (%)	142 (35)	281 (37)
Died after discharge from study hospitalization, n (%)	259 (65)	480 (63)
Days from discharge to death, median (IQR) [i]	27 (8-71)	28.5 (11-75.5)

Abbreviations: POLST, Physician Orders for Life-Sustaining Treatment; CHF, congestive heart failure; COPD, chronic obstructive pulmonary disease.

[a] Data were not abstracted for patients with full-treatment POLSTs.

[b] Includes nursing homes, skilled nursing facilities, acute rehabilitation, and long-term acute care.

[c] Includes organ dysfunction due to cancer or its treatment. Does not include non-structural infectious complications.

[d] Does not include respiratory failure due to CHF, COPD, end-stage renal disease, or end-stage liver disease.

[e] Does not include gastrointestinal bleeding due to cirrhosis or cancer.

[f] Includes all primary admitting diagnoses that could not be grouped into categories of ≥ 2% prevalence within each stratum. Examples: unexplained altered mental status, venous thromboembolic disease, limb ischemia, critical metabolic derangements.

[g] Place of death was missing from the death certificate for 16 patients in the comfort-only group, and 20 patients in the limited-interventions group.

[h] Includes individuals who survived the study hospitalization, were subsequently hospitalized at a non-study hospital, and died in the hospital during that hospitalization.

[i] Does not include those who died during the study hospitalization.