NIH PRAGMATIC TRIALS COLLABORATORY
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Intervention to promote communication about goals of care for hospitalized patients with serious illness

A randomized clinical trial

JAMA. **2023**;329(23):2028

Available at jama.com

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Conflict of Interest Disclosure

No conflicts of interest to disclose.

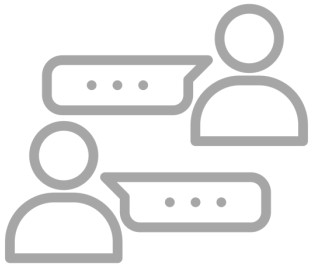
Funding and Support

R01 AG062441

J. Randall “Randy” Curtis

Background

- Goals of care discussions are associated with important patient and family outcomes.
- The EHR provides opportunities to identify patients who might benefit from goals of care discussions.



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Background

- Goals of care discussions and their documentation remain a shortcoming in many health systems.


ORIGINAL INVESTIGATION

HEALTH CARE REFORM

Failure to Engage Hospitalized Elderly Patients and Their Families in Advance Care Planning

Daren K. Heyland, MD, MSc, FRCPC; Doris Barwich, MD, CCFP; Deb Pichora, RN, MSc; Peter Dodek, MD, MHSc; Francois Lamontagne, MD, MSc, FRCPC; John J. You, MD, MSc; Carolyn Tayler, RN, BN, MSA, CON(C); Pat Porterfield, RN, MScN; Tasnim Sinuff, MD, PhD, FRCPC; Jessica Simon, MB, ChB, FRCPC; for the ACCEPT (Advance Care Planning Evaluation in Elderly Patients) Study Team and the Canadian Researchers at the End of Life Network (CARENET)

Importance: Advance care pla... centered care and potentially r... at the end of life.

Objectives: To inquire about ... before hospital...

Invited Commentary

May 13, 2013

Disregard of Patients' Preferences Is a Medical Error

Comment on "Failure to Engage Hospitalized Elderly Patients and Their Families in Advance Care Planning"

Theresa A. Allison, MD, PhD; Rebecca L. Sudore, MD

Author Affiliations | Article Information

JAMA Intern Med. 2013;173(9):787. doi:10.1001/jamainternmed.2013.203


Missed Opportunities during Family Conferences about End-of-Life Care in the Intensive Care Unit

J. Randall Curtis, Ruth A. Engelberg, Marjorie D. Wenrich, Sarah E. Shannon, Patsy D. Treece, and Gordon D. Rubenfeld

Depa... and ... Nursing

...re clinicians to ...onsider this an ...eral studies also ...th family mem...

Original article

Barriers and facilitators for goals of care discussions between residents and hospitalised patients

Kalpa Shah,[1,2] Marilyn Swinton,[3] John J You[1,3]

Patient and Family Engagement During Treatment Decisions in an ICU: A Discourse Analysis of the Electronic Health Record

Jacqueline M. Kruser, MD, MS[1,2]; Brian T. Benjamin, MD[1]; Elisa J. Gordon, PhD, MPH[3]; Kelly N. Michelson, MD, MPH[4]; Richard G. Wunderink, MD[1]; Jane L. Holl, MD, MPH[1,4,5]; Margaret L. Schwarze, MD, MPP[6,7]

Objectives: Shared decision-making is recommended for critically...

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Background

- Jumpstart: a communication-priming intervention

- Prior studies increased goals of care discussions
  - Outpatient 31% → 74%
  - Inpatient (pilot) 8% → 21%

- Challenges
  - Surveys of patients and families
  - Manual abstraction of EHR

Background

- Refinements made:
  - Creation of Jumpstart using EHR data rather than patient- or family-member surveys
  - Delivered to clinicians only
  - Automated population of Jumpstart guide fields
  - Automated Jumpstart delivery to clinicians by email

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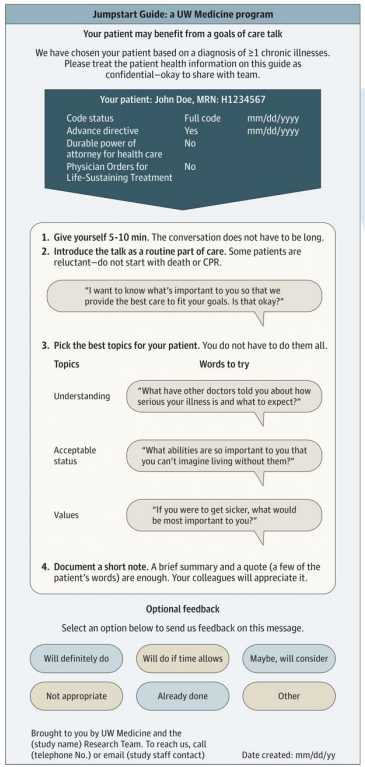
Curtis *et al* Intervention to promote goals of care discussions for hospitalized patients. *JAMA* 2023;329(28):2028

The Jumpstart Guide

Figure 2. Example of Intervention



Jumpstart Guide: a UW Medicine program

Your patient may benefit from a goals of care talk

We have chosen your patient based on a diagnosis of ≥1 chronic illnesses. Please treat the patient health information on this guide as confidential—okay to share with team.

Your patient: John Doe, MRN: H1234567

Code status	Full code	mm/dd/yyyy
Advance directive	Yes	mm/dd/yyyy
Durable power of attorney for health care	No	
Physician Orders for Life-Sustaining Treatment	No	

1. **Give yourself 5-10 min.** The conversation does not have to be long.
2. **Introduce the talk as a routine part of care.** Some patients are reluctant—do not start with death or CPR.

"I want to know what's important to you so that we provide the best care to fit your goals. Is that okay?"

3. **Pick the best topics for your patient.** You do not have to do them all.

Topics	Words to try
Understanding	"What have other doctors told you about how serious your illness is and what to expect?"
Acceptable status	"What abilities are so important to you that you can't imagine living without them?"
Values	"If you were to get sicker, what would be most important to you?"

4. **Document a short note.** A brief summary and a quote (a few of the patient's words) are enough. Your colleagues will appreciate it.

Optional feedback

Select an option below to send us feedback on this message.

Will definitely do | Will do if time allows | Maybe, will consider

Not appropriate | Already done | Other

Brought to you by UW Medicine and the (study name) Research Team. To reach us, call (telephone No.) or email (study staff contact)

Date created: mm/dd/yy

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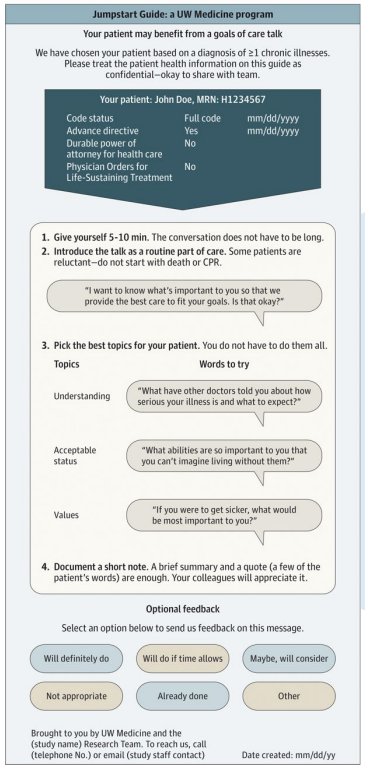

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Research Question

Can a patient-specific, clinician-facing communication priming intervention with discussion prompts effectively promote goals of care discussions between clinicians and hospitalized older adults with serious illness?

Jumpstart

?

Image source: National Hospice and Palliative Care Organization (caringinfo.org)

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Design and Setting

- Pragmatic randomized trial of Jumpstart vs usual care
  - Utilized waiver of consent; all eligible patients randomized
  - Randomization stratified by hospital and history of dementia

- 3 hospitals within UW Medicine system

University of Washington Medical Center
(quaternary academic center)

Harborview Medical Center
(county hospital, trauma center)

Northwest Hospital & Medical Center
(community hospital)

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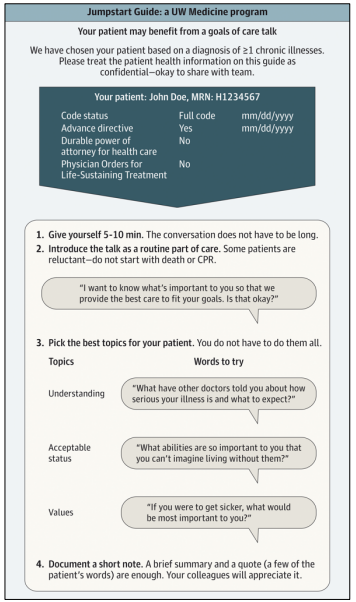
Patient Population

- Hospitalized (12-96 hours)
- Age ≥ 55 with at least one Dartmouth Atlas chronic condition; or, age ≥ 80
- Exclusions:
  - Documentation of goals of care discussion or palliative care consultation during current hospitalization
  - Transplant within prior year
  - Hospice or comfort measures only
  - Suicidality or confidential records

Jumpstart Delivery

Delivered to members of primary hospital team on day of randomization

- Secure email
- Reminder message via pager



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Primary Outcome

Proportion of patients with EHR-documented goals of care discussion within 30 days of randomization

- Goals of care discussions defined as discussions about overarching goals for medical care, but going *beyond* "just code status" (e.g. DNR/DNI)
- Identified by natural language processing (NLP) screened human abstraction

Why use NLP to screen records?

To manually review for GOC discussions:

2,500 patients' notes from randomization to +30 days

= 45,000 notes

= 320 million words

= 640,000 pages

= 1,300 reams of printer paper

= a stack of paper as tall as this 26-story building:

= 3000 abstractor-hours

= 3 abstractors x 0.4 FTE x **1.2 years**

= **$200,000**

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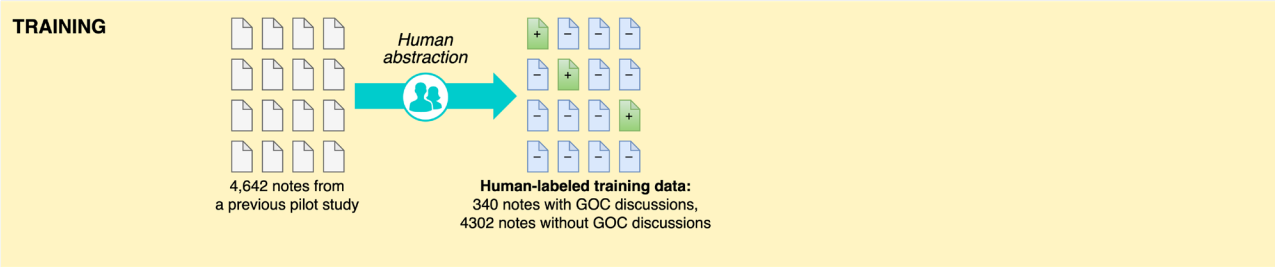
Why not just *search* the EHR for "goals of care"?

Search string	Sensitivity, note-level	Specificity, note-level
"goals of care"	38.3%	

Training NLP to identify GOC discussions



Lee RY et al. *JAMA Network Open*. 2023;6(3):e231204

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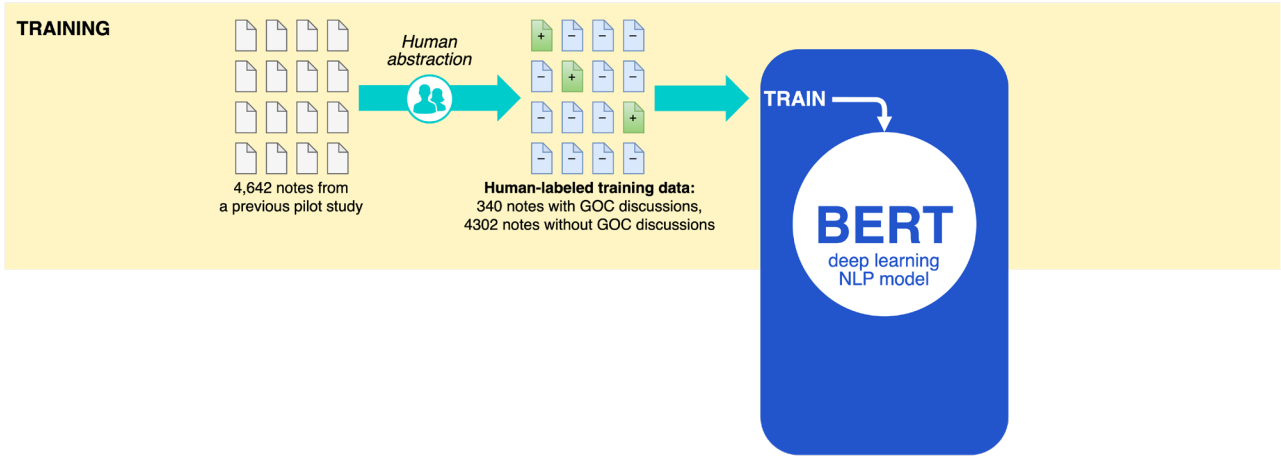

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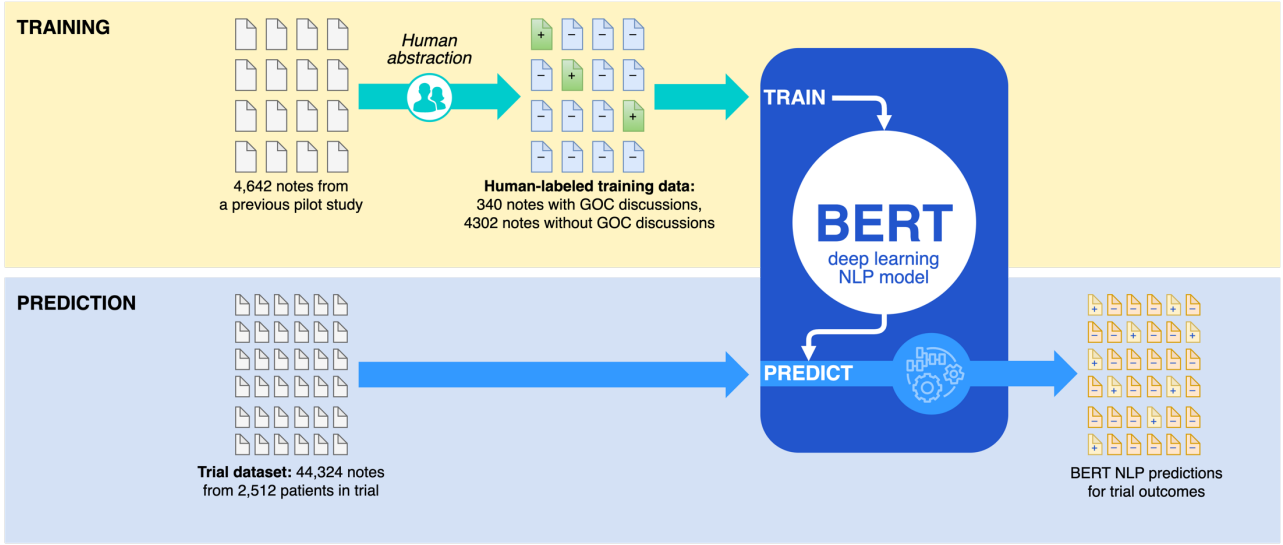

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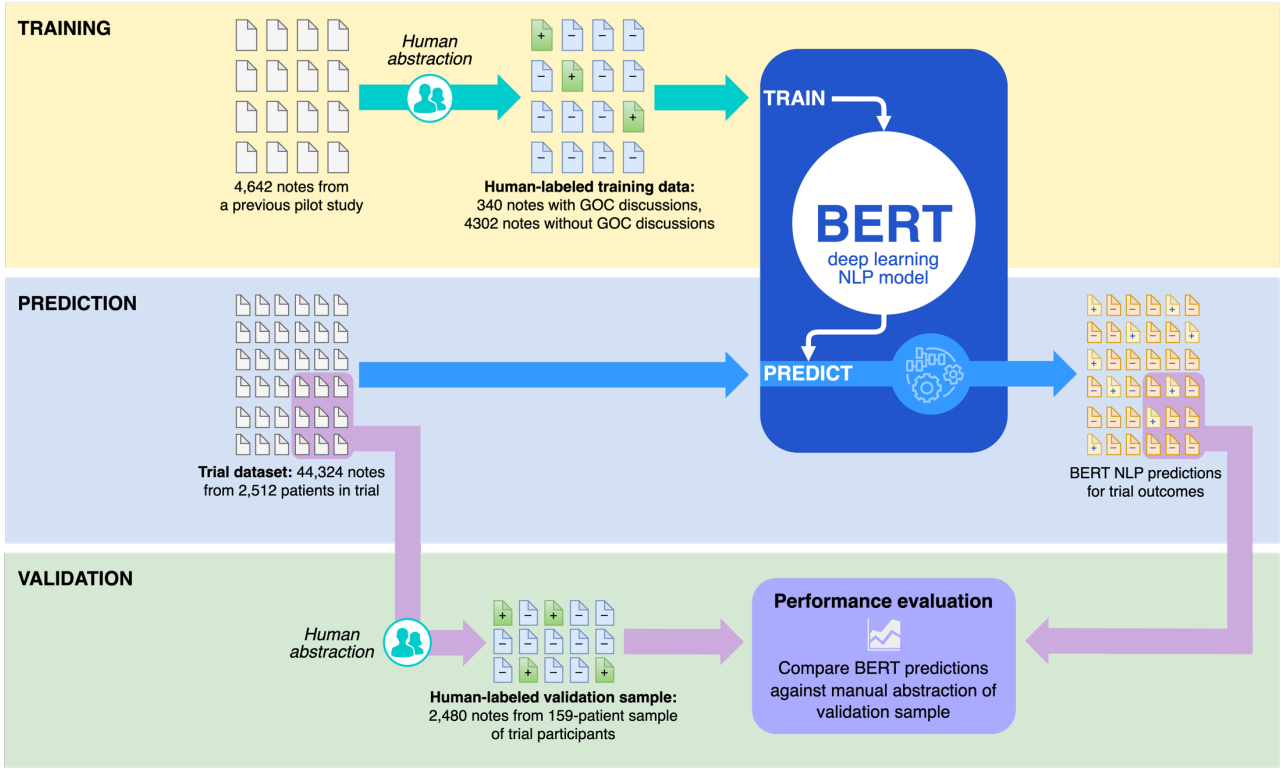
Validating the NLP model



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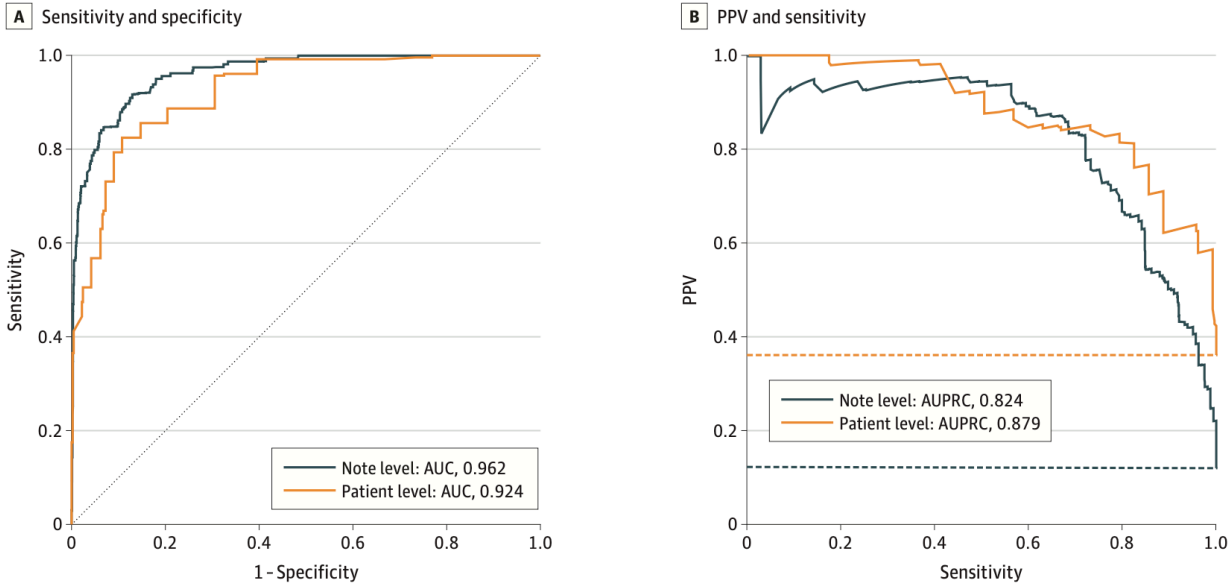

At maximal patient F_1: 82.5% sensitive, 89.2% specific

Lee RY et al. *JAMA Network Open*. 2023;6(3):e231204

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NLP-screened human abstraction

PRIMARY OUTCOME: Does the text shown above represent a goals -of-care discussion?

[Reference: PICSI-H1 Coding Flowchart.]

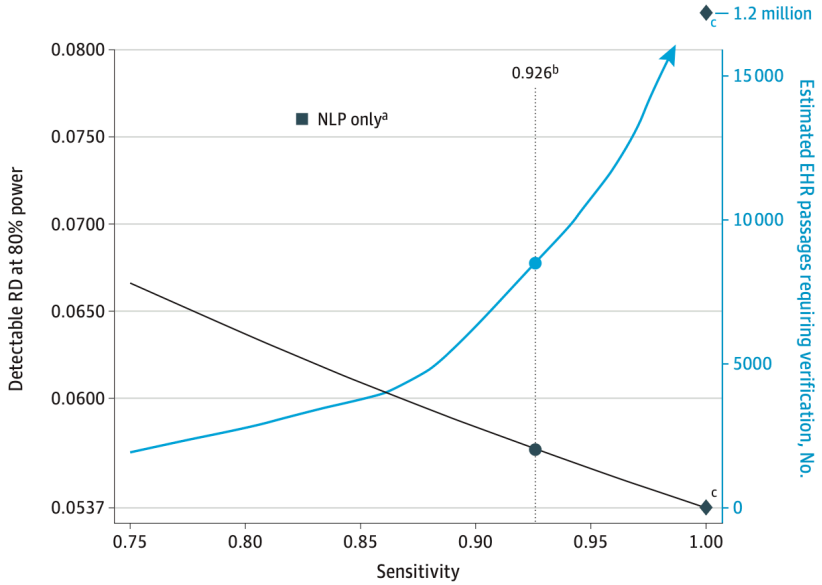
Selecting an NLP screening threshold

More permissive screening threshold
= more sensitivity for outcome
= more passages for humans to verify
= more study power (lower detectable risk difference)

We selected a screening threshold corresponding to:

- 92.6% patient-level sensitivity
- 22,187 (0.8%) EHR passages from 1,957 patients (78%) that screened positive; median 52 words per passage
- 34.3 abstractor-hours to adjudicate all screen-positive passages from randomization to first GOC discussion (or 30 days if none present)

  → 7,494 passages adjudicated to complete primary outcome
- Passages adjudicated in pseudo-random order, blinded to patient ID and randomization



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Secondary Outcomes

Obtained from the EHR 30 days after randomization

- ICU admissions
- ED visits
- Palliative care consultation
- ICU and hospital-free days
- Death
- Hospital readmission (within 7 days of discharge)

Patient Characteristics

Obtained from the EHR

- Race and ethnicity
  - Minoritized race or ethnicity = race and ethnicity other than non-Hispanic White
- Sex
- History of dementia
  - ICD-10 codes at randomization
  - Added manual adjudication of EHR notes

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Analysis

- Primary outcome:
  - Linear regression with robust SEs
  - Adjusted for hospital and history of dementia at randomization
  - Also evaluated effect of intervention by age, sex, minoritized race or ethnicity, dementia

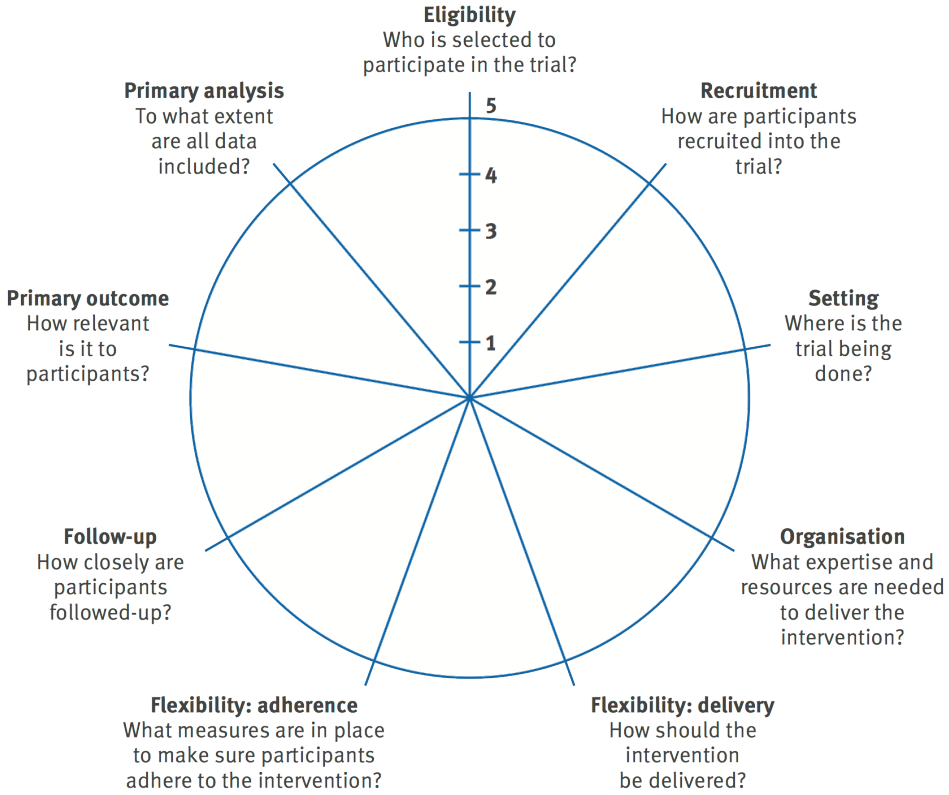
- Secondary outcomes:
  - Regression models similar to primary outcome approach

Pragmatic Design: Overview

- Sample
  - Daily report of "potentially-eligible" participants vs. manual review to confirm eligibility
- Jumpstart intervention
  - Auto-populate with EHR data in HTML/PDF format, email and text page vs. manually identify the clinical team to ensure appropriate delivery
- Outcomes
  - All outcomes identified automatically from EHR and, for goals of care, using NLP methods vs. use of human-screened abstraction to confirm positively identified goals of care documentation

PRECIS-2 Trial Design Tool

Pragmatic Explanatory Continuum Indicator Summary



Loudin K et al, *BMJ* 2015;350:h2147

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PRECIS-2 Trial Design Tool

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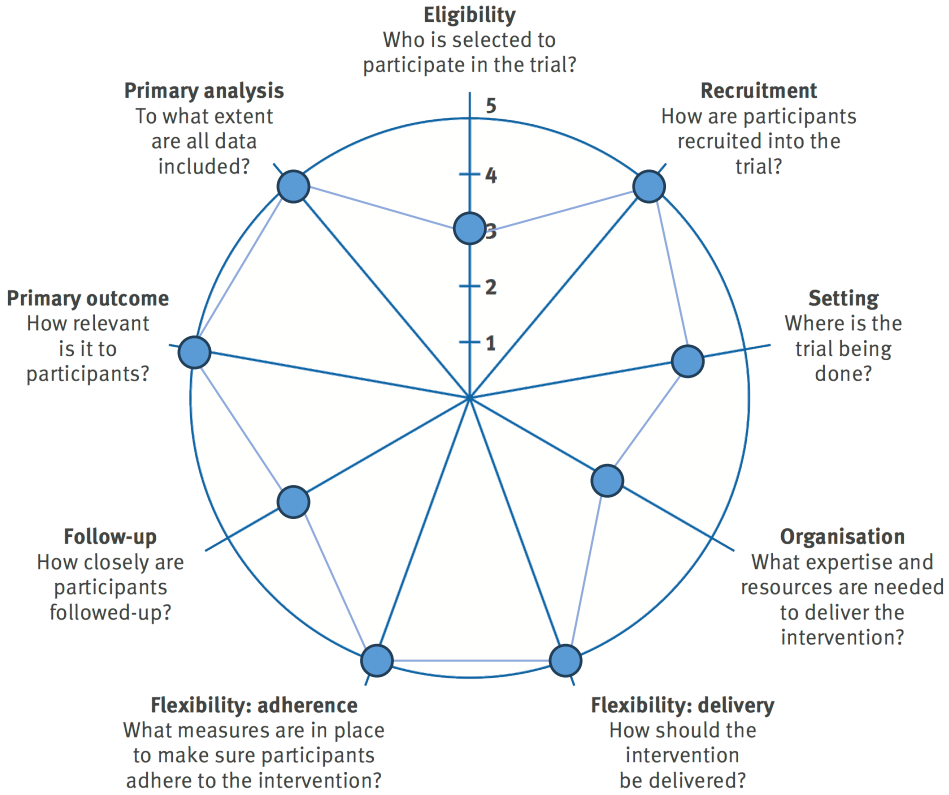

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PRECIS-2 Domains

→ **Eligibility**

Recruitment

Setting

Organisation

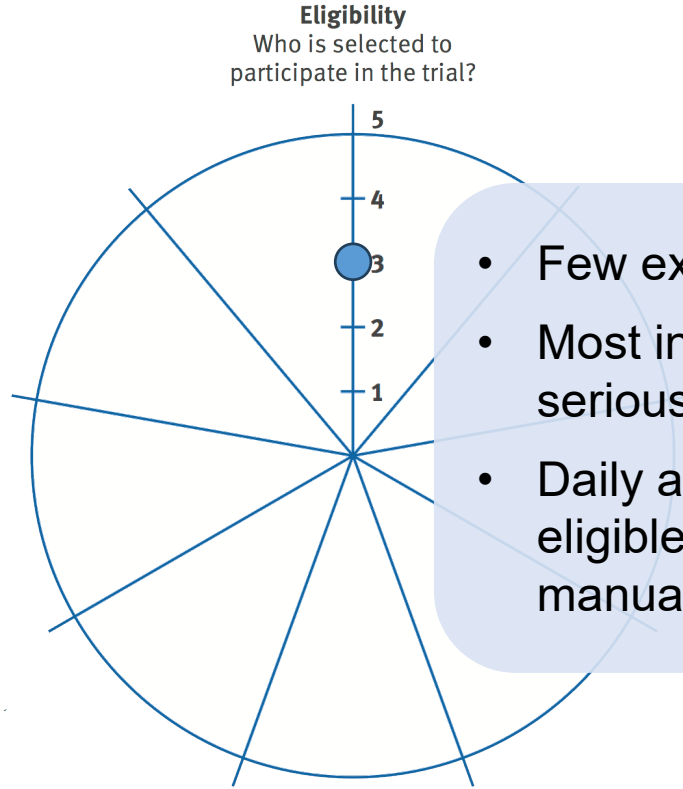
Flexibility: delivery

Flexibility: adherence

Follow-up

Primary outcome

Primary analysis



- Few exclusion criteria
- Most inclusion criteria, including serious illness, from EHR data
- Daily automated EHR reports of eligible patients that were manually reviewed

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PRECIS-2 Domains

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- Setting
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- Flexibility: adherence
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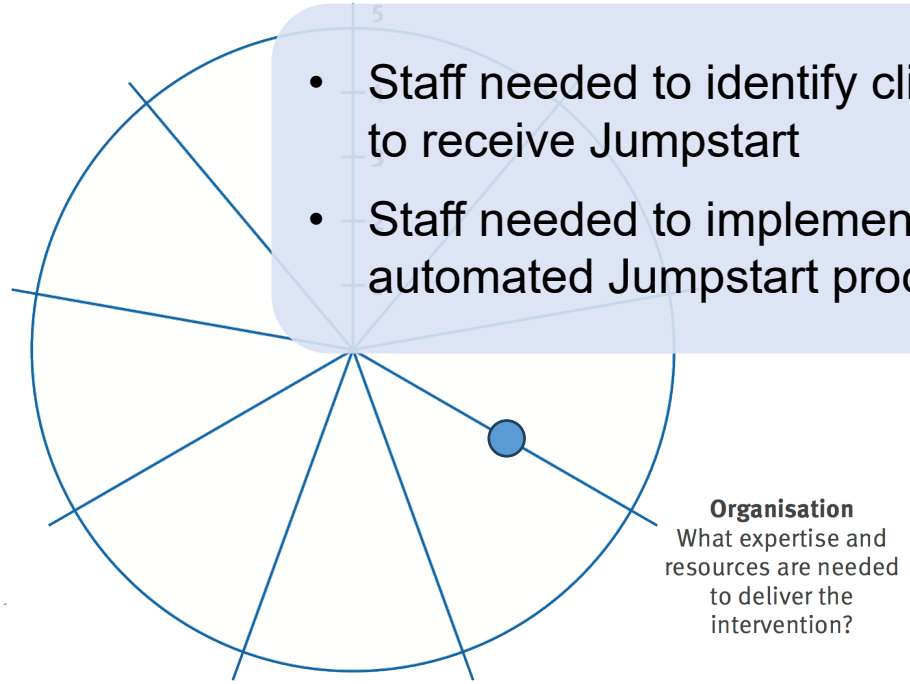

- Staff needed to identify clinical team to receive Jumpstart
- Staff needed to implement automated Jumpstart procedures

PRECIS-2 Domains

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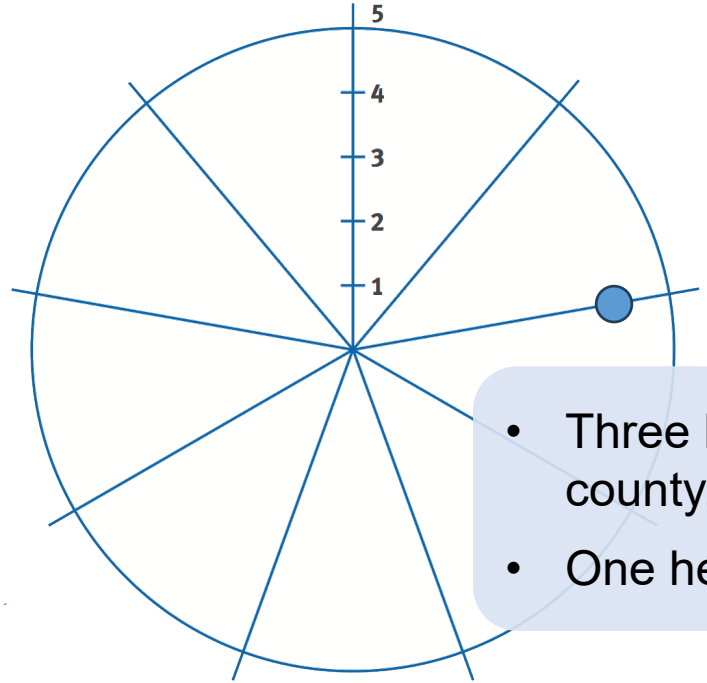

- Three hospitals: academic, county, community
- One health system

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PRECIS-2 Domains

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- Flexibility: delivery
- Flexibility: adherence
- → **Follow-up**
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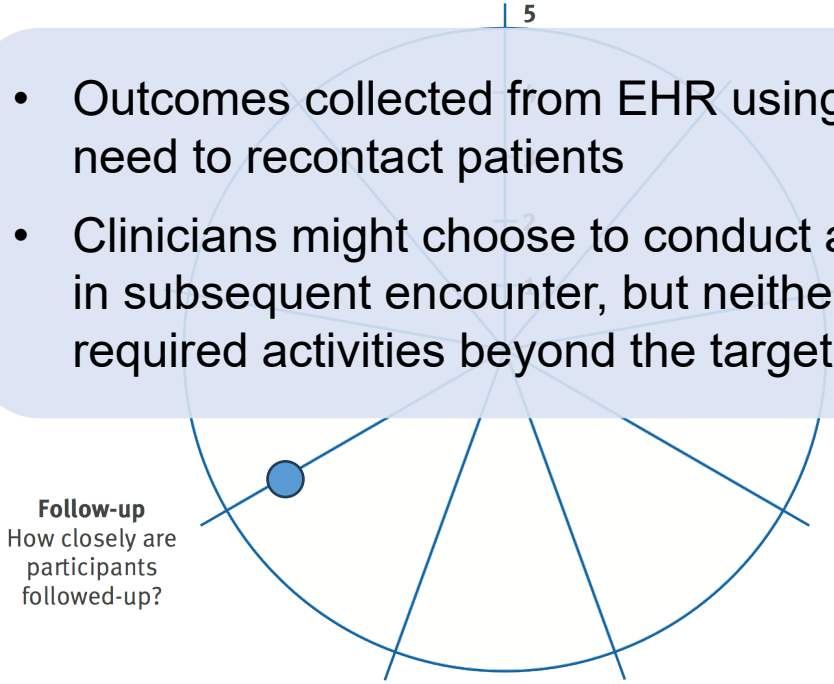

- Outcomes collected from EHR using automated methods; no need to recontact patients
- Clinicians might choose to conduct a goals-of-care discussion in subsequent encounter, but neither intervention nor follow-up required activities beyond the target hospitalization

PRECIS-2 Domains

- Eligibility
- → **Recruitment**
- Setting
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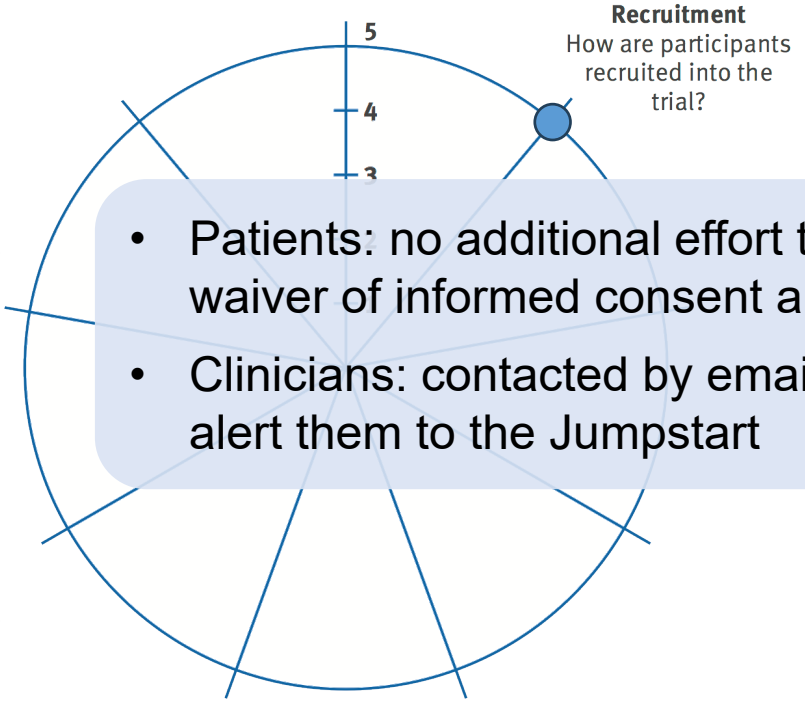

- Patients: no additional effort than usual care; waiver of informed consent approved by IRB
- Clinicians: contacted by email and text page to alert them to the Jumpstart

PRECIS-2 Domains

- Eligibility
- Recruitment
- Setting
- Organisation
- → **Flexibility: delivery**
- Flexibility: adherence
- Follow-up
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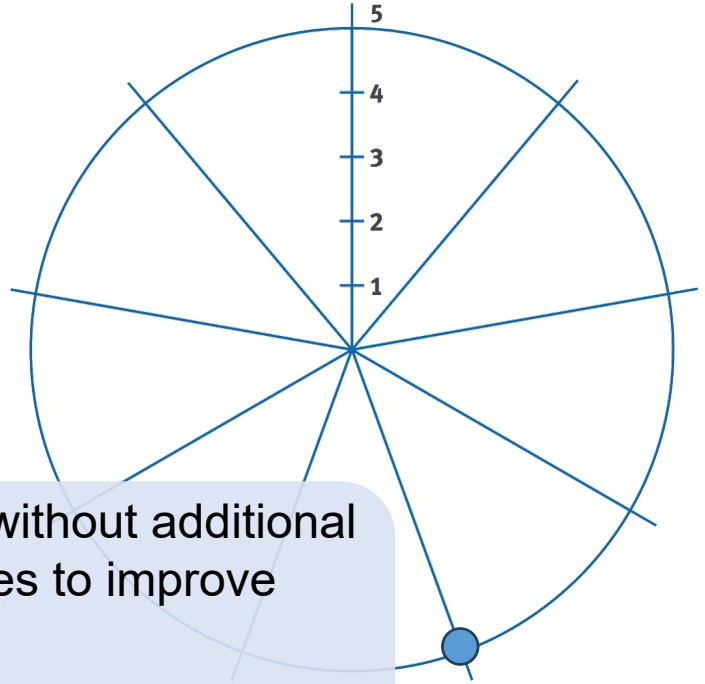

Flexibility: delivery
How should the intervention be delivered?

- Jumpstart provided without additional protocols or measures to improve compliance
- No specific advice on allowed co-interventions or complications

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PRECIS-2 Domains

- Eligibility
- Recruitment
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- → **Flexibility: adherence**
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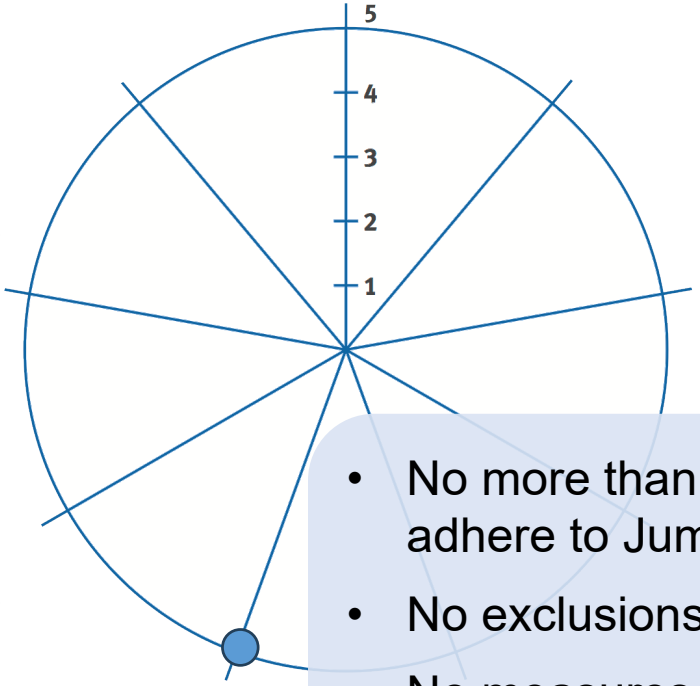
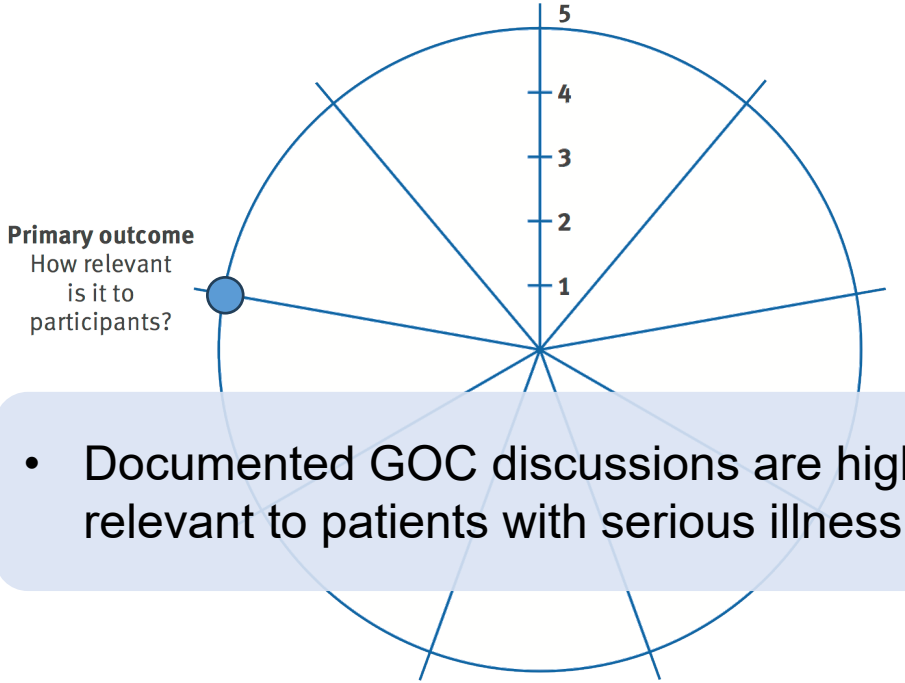


Flexibility: adherence
What measures are in place to make sure participants adhere to the intervention?

- No more than usual encouragement to adhere to Jumpstart recommendations
- No exclusions based on adherence
- No measures to improve adherence if found wanting

PRECIS-2 Domains

- Eligibility
- Recruitment
- Setting
- Organisation
- Flexibility: delivery
- Flexibility: adherence
- Follow-up
- → **Primary outcome**
- Primary analysis



- Documented GOC discussions are highly relevant to patients with serious illness

Curtis *et al* Intervention to promote goals of care discussions for hospitalized patients. *JAMA* 2023;329(28):2028

PRECIS-2 Domains

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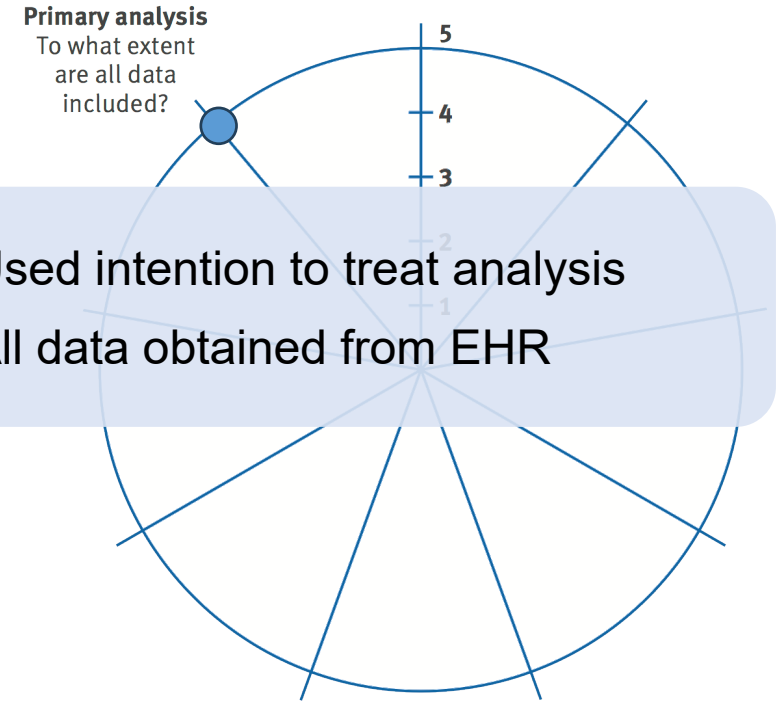

- Used intention to treat analysis
- All data obtained from EHR

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Results

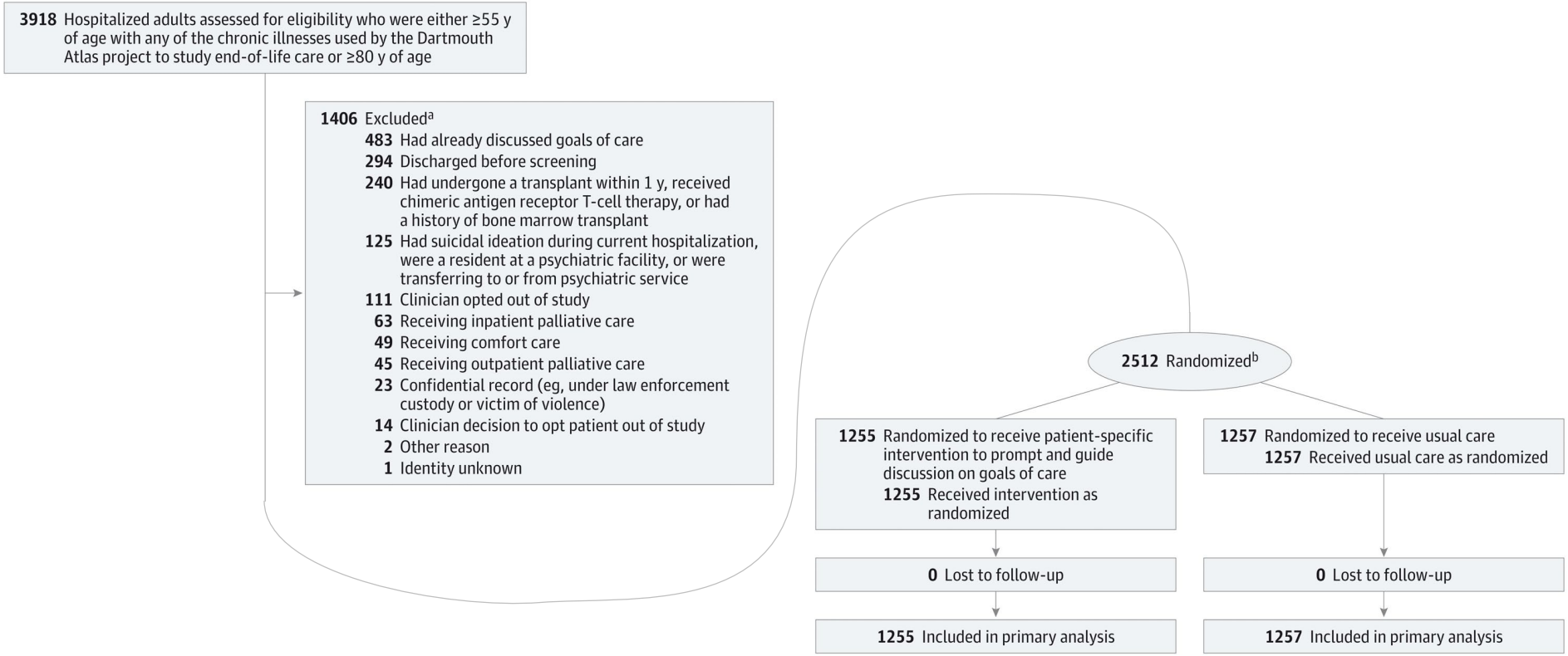
3918 Hospitalized adults assessed for eligibility who were either ≥55 y of age with any of the chronic illnesses used by the Dartmouth Atlas project to study end-of-life care or ≥80 y of age
1406 Excluded[a]
483 Had already discussed goals of care
294 Discharged before screening
240 Had undergone a transplant within 1 y, received chimeric antigen receptor T-cell therapy, or had a history of bone marrow transplant
125 Had suicidal ideation during current hospitalization, were a resident at a psychiatric facility, or were transferring to or from psychiatric service
111 Clinician opted out of study
63 Receiving inpatient palliative care
49 Receiving comfort care
45 Receiving outpatient palliative care
23 Confidential record (eg, under law enforcement custody or victim of violence)
14 Clinician decision to opt patient out of study
2 Other reason
1 Identity unknown
2512 Randomized[b]
1255 Randomized to receive patient-specific intervention to prompt and guide discussion on goals of care
1255 Received intervention as randomized
1257 Randomized to receive usual care
1257 Received usual care as randomized
0 Lost to follow-up
0 Lost to follow-up
1255 Included in primary analysis
1257 Included in primary analysis

Table 1. Demographics and Baseline Characteristics in a Trial of a Communication Guide

Characteristic	Intervention (n = 1255)	Usual care (n = 1257)
Age, median (IQR), y	70 (63-80)	70 (62-80)
Sex, No. (%)		
Female	543 (43.3)	513 (40.8)
Male	712 (56.7)	744 (59.2)
Race and ethnicity, No./total (%)[a]		
American Indian or Alaska Native	21/1218 (1.7)	24/1216 (2.0)
Asian	143/1218 (11.7)	149/1216 (12.3)
Black	168/1218 (13.8)	148/1216 (12.2)
Hispanic	77/1248 (6.2)	73/1249 (5.8)
Native Hawaiian or Pacific Islander	4/1218 (0.3)	9/1216 (0.7)
Non-Hispanic	1171/1248 (93.8)	1176/1249 (94.2)
White	882/1218 (72.4)	886/1216 (72.9)
Minoritized race or ethnicity, No./total (%)[b]	409/1224 (33.4)	394/1220 (32.3)
Marital status, No./total (%)		
Married	502/1238 (40.5)	515/1242 (41.5)
Single	346/1238 (27.9)	349/1242 (28.1)
Widowed	199/1238 (16.1)	187/1242 (15.1)
Divorced or separated	191/1238 (15.4)	191/1242 (15.4)
Limited spoken English proficiency, No. (%)		
No	1061 (84.5)	1078 (85.8)
Yes (prefer another spoken language)	186 (14.8)	171 (13.6)
Use American Sign Language or need interpreter or interpreter services	3 (0.3)	0
Preferred language not documented	5 (0.4)	8 (0.6)

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Table 1. Demographics and Baseline Characteristics in a Trial of a Communication Guide

Characteristic	Intervention (n = 1255)	Usual care (n = 1257)
Chronic illness (categories are not mutually exclusive), No. (%)[c]		
Coronary artery disease	424 (33.8)	442 (35.2)
Heart failure	356 (28.4)	342 (27.2)
Lung disease	339 (27.0)	341 (27.1)
Kidney failure	301 (24.0)	326 (25.9)
Cancer	300 (23.9)	296 (23.5)
Peripheral vascular disease	269 (21.4)	269 (21.4)
Diabetes	190 (15.1)	196 (15.6)
Dementia		
History of dementia at randomization[d]	140 (11.2)	140 (11.1)
Expanded definition for history of dementia[e]	172 (13.7)	183 (14.6)
Liver disease	163 (13.0)	152 (12.1)
Deyo-Charlson Comorbidity Index, median (IQR)[f]	4 (2-6)	4 (3-6)
Advance directive in EHR prior to admission, No. (%)	97 (7.7)	134 (10.7)
Designated power of attorney prior to enrollment, No. (%)	154 (12.3)	167 (13.3)
POLST prior to enrollment, No. (%)	94 (7.5)	90 (7.2)
Hospital, No. (%)		
County	485 (38.6)	487 (38.7)
Community	328 (26.1)	327 (26.0)
University	442 (35.2)	443 (35.2)

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Results

Table 2. Effect of Clinician-Facing Intervention on Primary and Secondary Outcomes

	Intervention (n = 1255)	Usual care (n = 1257)	Adjusted difference, % (95% CI)[a]	*P* value[a]
Primary outcome				
EHR-documented goals-of-care discussions within 30 d, No. (%)	433 (34.5)	382 (30.4)	4.1 (0.4 to 7.8)	.03
Secondary outcomes				
Required ICU care within 30 d after randomization, No. (%)	343 (27.3)	356 (28.3)	−1.0 (−4.4 to 2.5)	.58
Required ED care within 30 d after randomization, No. (%)	217 (17.3)	234 (18.6)	−1.3 (−4.3 to 1.7)	.39
Hospital readmission within 7 d after hospital discharge, No. (%)	81 (6.5)	90 (7.2)	−0.7 (−2.7 to 1.3)	.48
Death within 30 d after randomization, No. (%)	70 (5.6)	64 (5.1)	0.5 (−1.3 to 2.2)	.59
Palliative care consultation within 30 d after randomization, No. (%)	63 (5.0)	62 (4.9)	0.001 (−1.6 to 1.8)	.91
Time spent out of ICU and alive within 30 d after randomization, mean (SD), d	27.8 (6.2)	27.9 (6.1)	−0.08 (−0.6 to 0.4)[b]	.75
Time spent out of hospital and alive within 30 d after randomization, mean (SD), d	21.6 (9.1)	22.0 (8.7)	−0.4 (−1.1 to 0.3)[b]	.31
Time spent in hospital after randomization, mean (SD), d	8.4 (11.9)	8.1 (12.1)	0.3 (−0.6 to 1.3)[b]	.48

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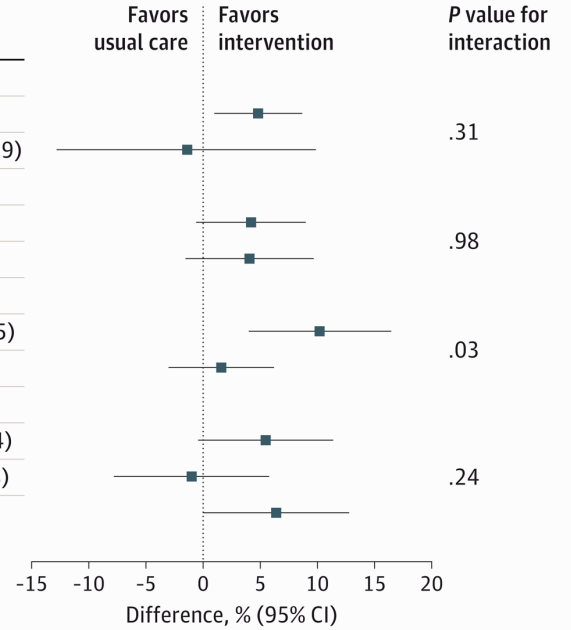
Modifiers of Treatment Effect

Figure 3. Comparison of Subgroups With Regard to Associations Between the Intervention Effect and the Occurrence of Discussions on Goals of Care

	Documented goals-of-care discussion within 30 d, No./total (%)		Difference, % (95% CI)
	Intervention	Usual care	
History of dementia at randomization[a]			
No dementia	385/1115 (34.5)	332/1117 (29.7)	4.8 (1.0 to 8.7)
Dementia	48/140 (34.3)	50/140 (35.7)	-1.4 (-12.8 to 9.9)
Sex[b]			
Male	246/712 (34.6)	226/744 (30.4)	4.2 (-0.6 to 9.0)
Female	187/543 (34.4)	156/513 (30.4)	4.1 (-1.5 to 9.7)
Race and ethnicity[b]			
Minoritized race or ethnicity	146/409 (35.7)	101/394 (25.6)	10.2 (4.0 to 16.5)
Non-Hispanic White	276/815 (33.9)	266/826 (32.2)	1.6 (-3.0 to 6.2)
Study site[c]			
County	171/485 (35.3)	145/487 (29.8)	5.5 (-0.4 to 11.4)
Community	85/328 (25.9)	88/327 (26.9)	-1.0 (-7.8 to 5.8)
University	177/442 (40.0)	149/443 (33.6)	6.4 (0 to 12.8)



Modifiers of Treatment Effect

Figure 3. Comparison of Subgroups With Regard to Associations Between the Intervention Effect and the Occurrence of Discussions on Goals of Care

	Documented goals-of-care discussion within 30 d, No./total (%)		Difference, % (95% CI)	*P* value for interaction
	Intervention	Usual care		
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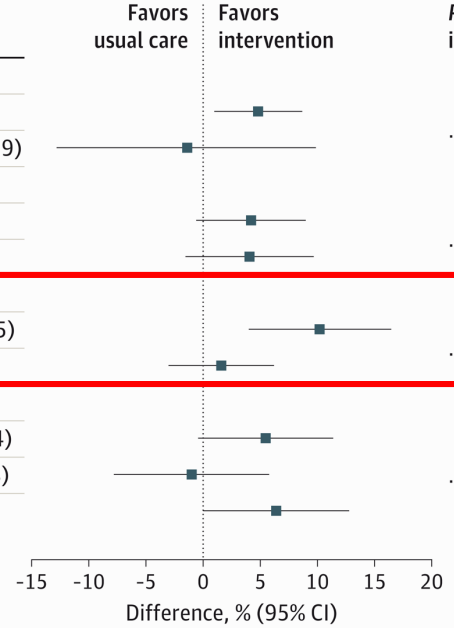

Conclusion

Among hospitalized older adults with serious illness, a pragmatic clinician-facing communication-priming intervention significantly improved documentation of goals of care discussions in the electronic health record, with a greater effect size in racially or ethnically minoritized patients.

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Limitations

- Single healthcare system in one region
- Potential for outcome misclassification using EHR
- Potential for bias from differential performance of NLP model
- Goals-of-care discussion is a complex construct with variable quality
- Combined single category of racially or ethnically minoritized patients

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Implications

- Provides evidence that a low-touch intervention can nudge clinicians to change behavior
- Overall prevalence of goals-of-care discussions is low suggesting opportunity for improvement
- Jumpstart may be useful in enhancing equity in serious illness communication among racially or ethnically minoritized patients

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Gratitude

Jumpstart

PICSI-H Trial 1 Study Team

- J. Randall Curtis, MD MPH (PI)
- Ruth A. Engelberg, PhD (PI)
- Robert Y. Lee, MD MS
- Lyndia C. Brumback, PhD
- Lois Downey, MA
- Janaki Torrence, MS
- Nicole LeDuc, BS
- Kasey Mallon Andrews, MS
- Jennifer Im, MSc
- Joanna Heywood, BS
- Crystal E. Brown, MD MA
- James Sibley, BS
- William B. Lober, MD MS
- Trevor Cohen, MBChB PhD
- Bryan J. Weiner, PhD
- Nita Khandelwal, MD MS
- Nauzley Abedini, MD MSc

Funding and Support

- NIH National Institute on Aging
- CAMBIA health foundation
- UW Medicine

CAMBIA PALLIATIVE CARE **CENTER OF EXCELLENCE** AT THE UNIVERSITY *of* WASHINGTON

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Thank you!

JAMA. **2023**;329(23):2028

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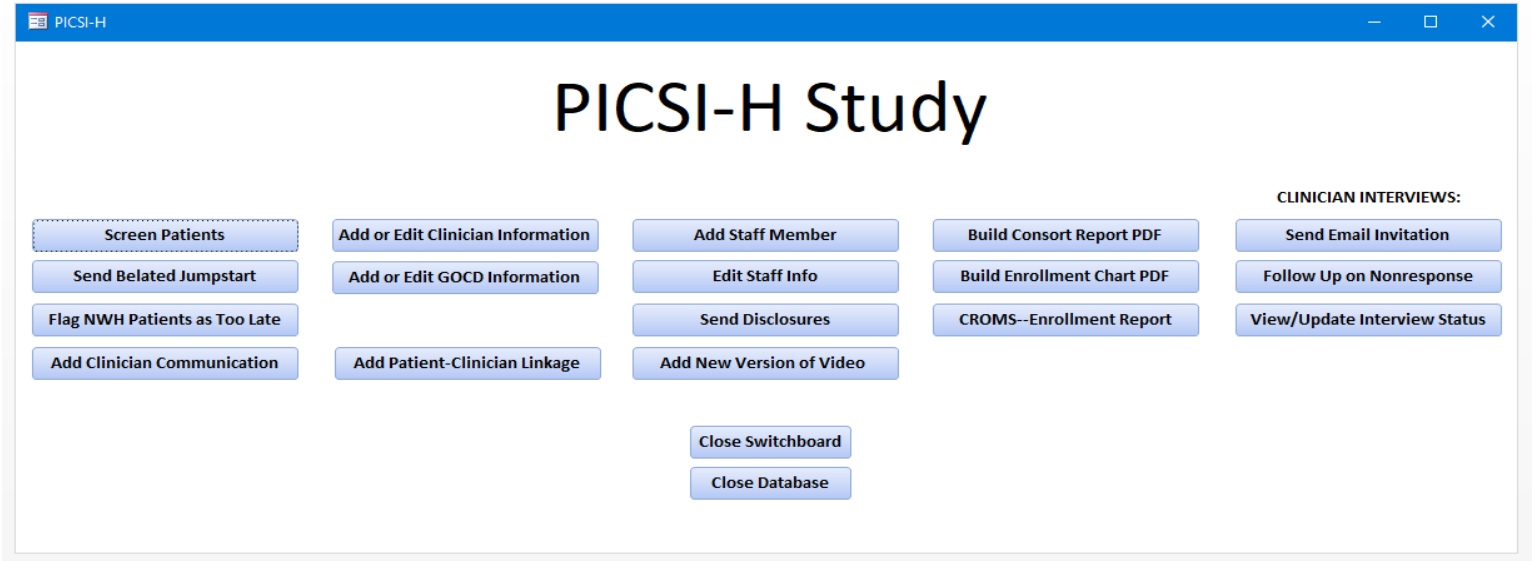
AT THE UNIVERSITY *of* WASHINGTON

Tools: Database



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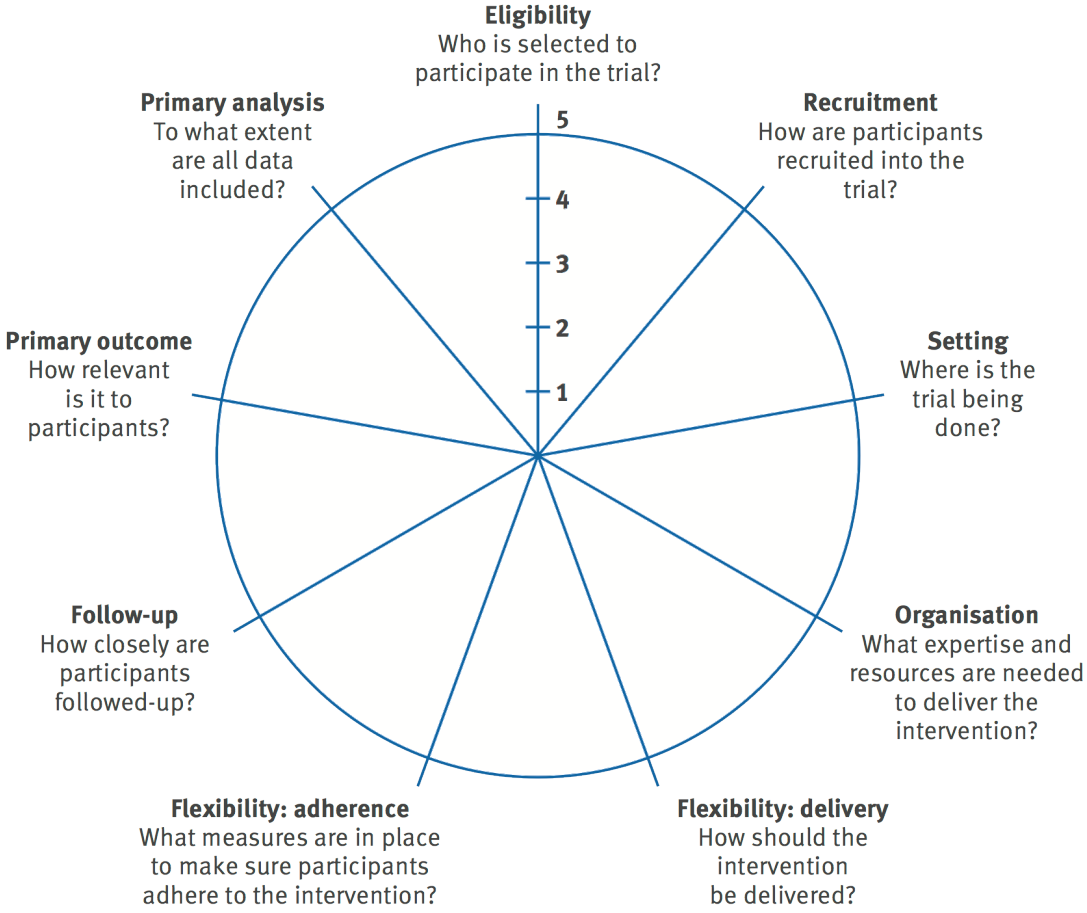

Loudin K et al, *BMJ* 2015;350:h2147

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Pragmatic Design

Automated

Sample
- Daily “pre-eligible” report

Jumpstart intervention
- Form: Prepopulated by EHR data
- Format: HTML or PDF
- Delivery: Email and text page

Outcomes
- NLP algorithm
- Utilization from EHR

Manual assistance

Sample
- Patients: eligibility confirmation

Jumpstart intervention
- Delivery: identification of hospital clinician team

Outcomes
- Human-screened abstraction of positively identified goals of care documentation

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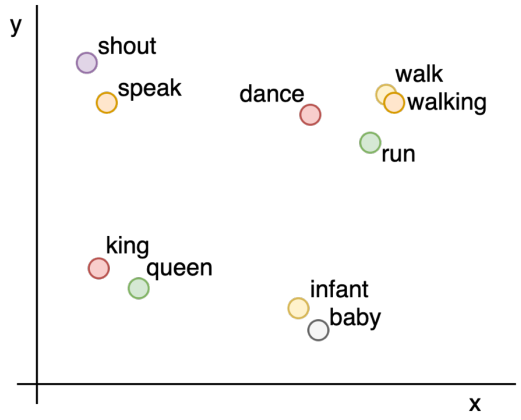
NLP: From words to "vectors"

1-dimensional vector representation ("Bag of words")

```
a ..... 273
aardvark ... 274
abrupt ..... 275
agree ..... 276
apple ..... 277
animal ..... 278
anchor ..... 279
argue ..... 280
artist ..... 281
assist ..... 282
awkwardly .. 283
...          ...
```

Hypothetical 2-dimensional vector representation



NLP: From words to "vectors"

stand 1 of 2 verb

'stand

stood 'stůd ; **standing**

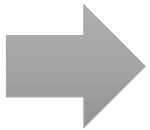
Synonyms of *stand* ›

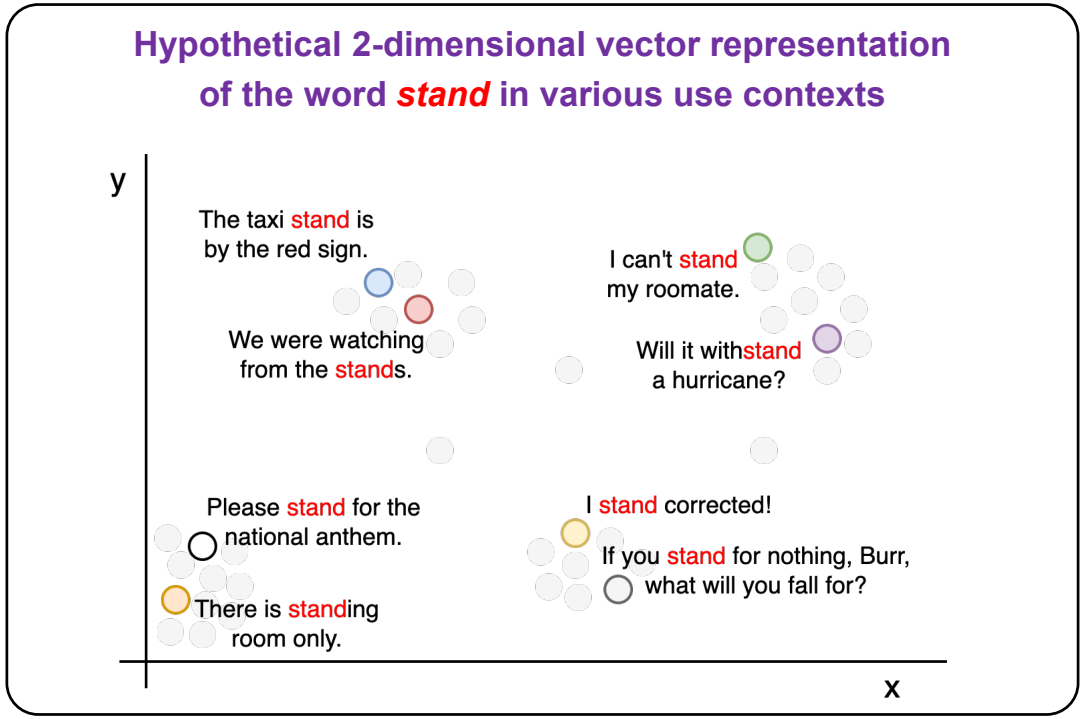
intransitive verb

1 **a** : to support oneself on the feet in an erect position
b : to be a specified height when fully erect
stands six feet two
c : to rise to an erect position

2 **a** : to take up or maintain a specified position or posture
stand aside
can you *stand* on your head
b : to maintain one's position
stand firm

3 : to be in a particular state or situation
stands accused





Dictionary source: *Merriam-Webster.com* Dictionary

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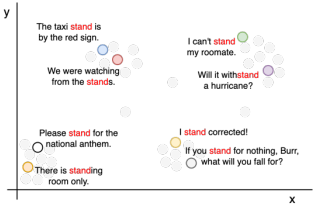
BERT NLP models

Our hypothetical 2-D vector model



BERT: 768-dimensional vectors in a 12-layer 12-head deep learning model

- Released as free software by Google Research in 2018
- Each *token* (i.e. subword) is represented by a 768-dimensional vector that represents its relationship to surrounding tokens in **pretraining** data.*
  * Pretraining data for $BERT_{BASE}$: English Wikipedia + BookCorpus (11,000 unpublished books); Bio+ClinicalBERT = $BERT_{BASE}$ + 200,000 PubMed abstracts + 270,000 PubMed Central articles
- Input vectors are *transformed* through successive layers of a *deep learning* model to generate context-specific abstract representations of language.
- **Fine-tuning:** The 110 million parameters of the model may be further fitted to user-supplied data for the purpose of a given NLP task.

BERT = Bidirectional Encoder Representations from Transformers

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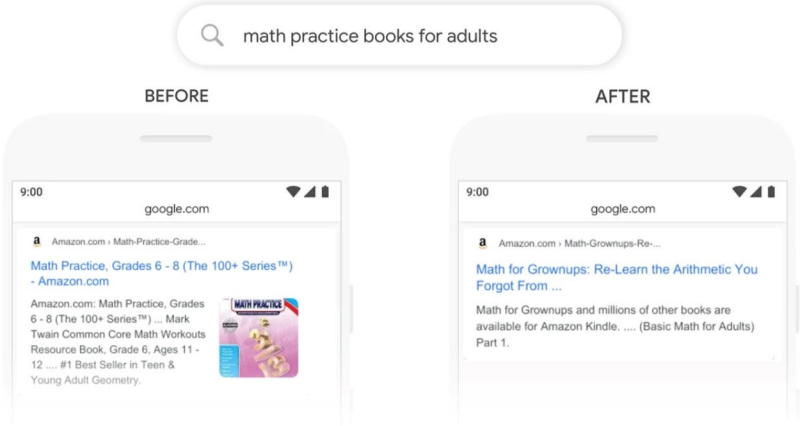
BERT NLP models

Goal: A more nuanced representation of language that best captures its meaning.



While the previous results page included a book in the "Young Adult" category, BERT can better understand that "adult" is being matched out of context, and pick out a more helpful result.

BERT = Bidirectional Encoder Representations from Transformers

Source: https://blog.google/products/search/search-language-understanding-bert/

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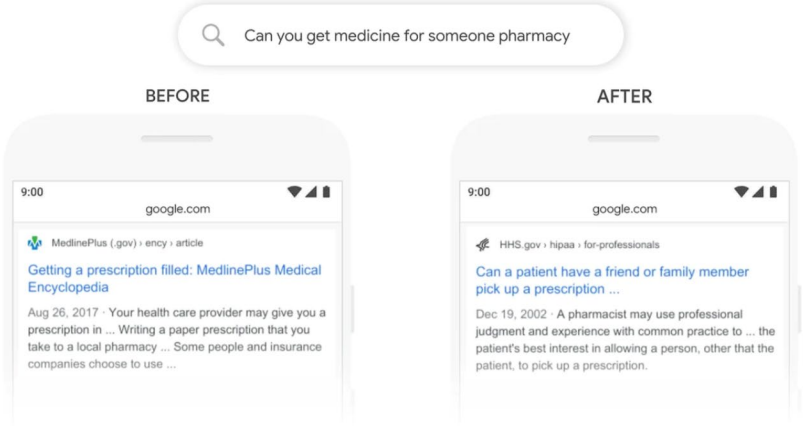
BERT NLP models

Goal: A more nuanced representation of language that best captures its meaning.



With the BERT model, we can better understand that “for someone” is an important part of this query, whereas previously we missed the meaning, with general results about filling prescriptions.

BERT = Bidirectional Encoder Representations from Transformers

Source: https://blog.google/products/search/search-language-understanding-bert/

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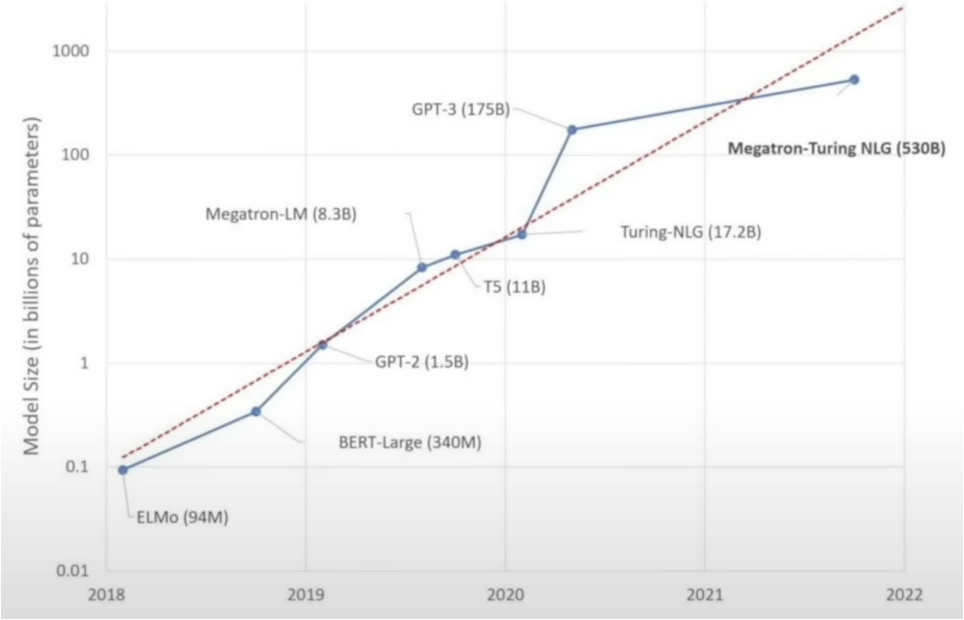
BERT NLP models

… ARE ALREADY OUTDATED!



BERT = Bidirectional Encoder Representations from Transformers

Source: Peter Lee PhD, Microsoft Research, https://www.youtube.com/watch?v=bEovhfxJsM4

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PRECIS-2 Trial Domains, Scores and Rationale

Domain	Score	Rationale
Eligibility Criteria	3	Although limited number of exclusionary characteristics that identify patients with serious illness, collected daily from the EHR and requiring both automated reports and manual review.
Recruitment Path	5	Patients: no additional effort than what would be used in usual care; waiver of informed consent approved by site IRB. Clinicians: contacted by email and accompanying page to alert them to the JS.
Setting	4	Academic, community and county hospital
Organization intervention	3	Additional staff to manually screen for patient eligibility, identify clinical team for receipt of JS, and implement automated JS procedures.
Flex of experimental intervention-Delivery	5	JS provided without additional protocols or measures to improve compliance; no specific advice on allowed co-interventions or complications.
Flex of experimental intervention- Adherence	5	No more than usual encouragement to adhere to the JS recommendations; no exclusions based on adherence and no measures to improve adherence if found wanting.
Follow-up	4	Clinicians might choose to schedule another visit or a longer visit to conduct a GOC discussion, but neither the intervention nor follow-up required additional activities beyond the target visit. Outcome data collected from the EHR using primarily automated methods.
Primary Outcome	5	Occurrence of GOC discussions with clinicians identified with NLP-screened human abstraction- highly relevant to patients with serious illness.
Primary Analysis	5	Intent to treat analysis and complete data derived from the EHR.

Domain	Definition	Score	Rationale
Eligibility Criteria	Who is selected to participate in the trial?	3	Although limited number of exclusionary characteristics that identify patients with serious illness, collected daily from the EHR and requiring both automated reports and manual review.
Recruitment Path	How are participants recruited into the trial?	5	Patients: no additional effort than what would be used in usual care; waiver of informed consent approved by site IRB. Clinicians: contacted by email and accompanying page to alert them to the JS.
Setting	Where is the trial being done?	4	Academic, community and county hospital
Organization intervention	What expertise and resources are needed to deliver the intervention?	3	Additional staff to manually screen for patient eligibility, identify clinical team for receipt of JS, and implement automated JS procedures.
Flex of experimental intervention-Delivery	How should the intervention be delivered?	5	JS provided without additional protocols or measures to improve compliance; no specific advice on allowed co-interventions or complications.
Flex of experimental intervention-Adherence	What measurements are in place to make sure participants adhere to the intervention?	5	No more than usual encouragement to adhere to the JS recommendations; no exclusions based on adherence and no measures to improve adherence if found wanting.
Follow-up	How closely are participants followed up?	4	Clinicians might choose to schedule another visit or a longer visit to conduct a GOC discussion, but neither the intervention nor follow-up required additional activities beyond the target visit. Outcome data collected from the EHR using primarily automated methods.
Primary Outcome	How relevant is it to participants?	5	Occurrence of GOC discussions with clinicians identified with NLP-screened human abstraction- highly relevant to patients with serious illness.
Primary Analysis	To what extent are all data included?	5	Intent to treat analysis and complete data derived from the EHR.