

Primary Palliative Care for Emergency Medicine (PRIM-ER), a clustered-randomized stepped wedge trial across 33 Emergency Departments

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EMERGENCY ROOM



Research in Emergency Care

- Window to population health
- Research agenda to end disparities, & address the needs of society's most vulnerable



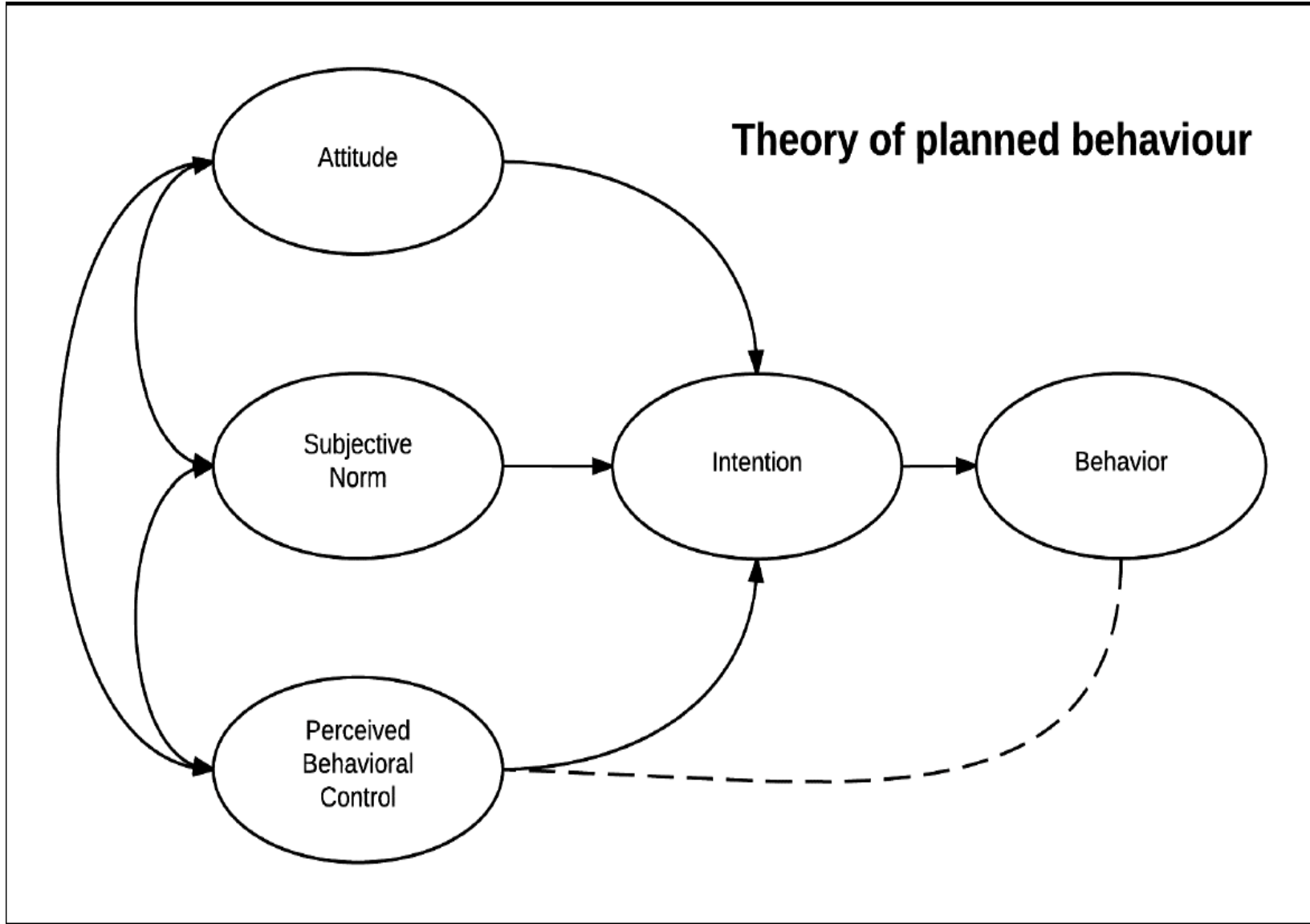
Background

- Increasing ED visits by older adults with serious illness
- Most prefer to receive care at home and to minimize life- sustaining procedures
- Inpatient palliative care improves quality of life and decreases health care use when triggered by an ED visit
- ED-triggered community-based palliative care?

Default Approach



Goal of PRIM-ER: Provider and system change



PRIM-ER Intervention Components

1. Evidence-based, multidisciplinary primary palliative care education (EPEC-EM, ELNEC);
2. Simulation-based workshops on communication in serious illness (EM Talk);
3. Clinical decision support (CDS); and
4. Provider audit and feedback.



CDS Design Considerations

Interruptive versus Non-Interruptive Alerts

- Fast-paced environment

Alert Timing

- Optimal time may vary by provider

Alert Audience

- Dependent on role and local ED culture

CDS Core Functions

Alert Name	Triggering Criteria	Target provider	Response options
Advance Care Planning Document Present	Active ACP document + ESI 1 or 2	Nurse	Inform and acknowledge
	Active ACP document	Provider	Initiate a goals of care conversation. Consider ordering a social work or palliative care consult.
Hospice	Previous discharge disposition to hospice	Social Worker/Care Manager	Inform and acknowledge
		Provider	Consider ordering a social work or palliative care consult.
Serious Life-limiting Illness without Advance Care Planning Documentation	Surrogates for “serious life limiting illness” including historical data points (previous order for palliative care consult, previous order for “Do Not Resuscitate”) and data points from current ED counter (e.g. albumin < 2 g/dL, GFR < 15 ml/min/m ²)	Provider	Initiate a goals of care conversation. Consider ordering a social work or palliative care consult.

Function 1: Identify seriously ill patients with ACP documents

BestPractice Advisory - SupportiveCare,TestOne

! Active eMOLST

Patient has an active eMOLST. This document outlines a patient's wishes in the setting of serious life-limiting illness. Please access this document to learn more about the patient's wishes for care.

Acknowledge Reason _____

Acknowledged

Function 2: Identify patients on hospice

BestPractice Advisory - SupportiveCare,TestTwo

ⓘ Active Hospice

This patient has previously been referred to or enrolled with hospice services. Evaluate for social needs and notify hospice services, if appropriate.

Acknowledge Reason _____

Acknowledged

✓ Accept



Dismiss

Function 3: Refer patients to interdisciplinary services

BestPractice Advisory - SupportiveCare,TestThree

ⓘ Active Hospice

This patient has previously been referred to or enrolled with hospice services. Consult Social Work and consider Palliative Care consultation.

<input checked="" type="checkbox"/> Order	<input type="checkbox"/> Do Not Order	 IP CONSULT TO SOCIAL WORK
<input checked="" type="checkbox"/> Order	<input type="checkbox"/> Do Not Order	 IP CONSULT TO PALLIATIVE CARE

Acknowledge Reason _____

<input type="checkbox"/> SW and Palliative Care Consults Ordered	<input type="checkbox"/> No Order at this time
--	--

Accept **Dismiss**

Function 4: Initiate goals of care conversation

BestPractice Advisory - SupportiveCare,TestSixteen

⚠️ Goals of Care Discussion Trigger (No eMOLST on file)

This patient **does not** have an eMOLST on file but does possibly have a serious life-limiting illness based on criteria met (see criteria in **blue** below).

Start a goals of care conversation.

Do you think this patient may die during this hospitalization?

OR

Do they have any one of the following?

- Worsening in functional status?
- Uncontrolled symptoms due to a life-limiting illness?
- Unclear goals of care?

If yes, then order a Social Work and Palliative Care Consult.

If no, then dismiss BPA.

Criteria met:

ECOG=4, Poor functional status

Aims and Hypothesis

Aims

- To test the effectiveness of PRIM-ER on ED disposition and healthcare use in older adults with serious, life-limiting illness using a pragmatic, cluster-randomized stepped wedge design in 33 EDs
- Describe barriers and facilitators to implementation at the micro- (individual), meso- (department and institutional), and macro- (health system) level

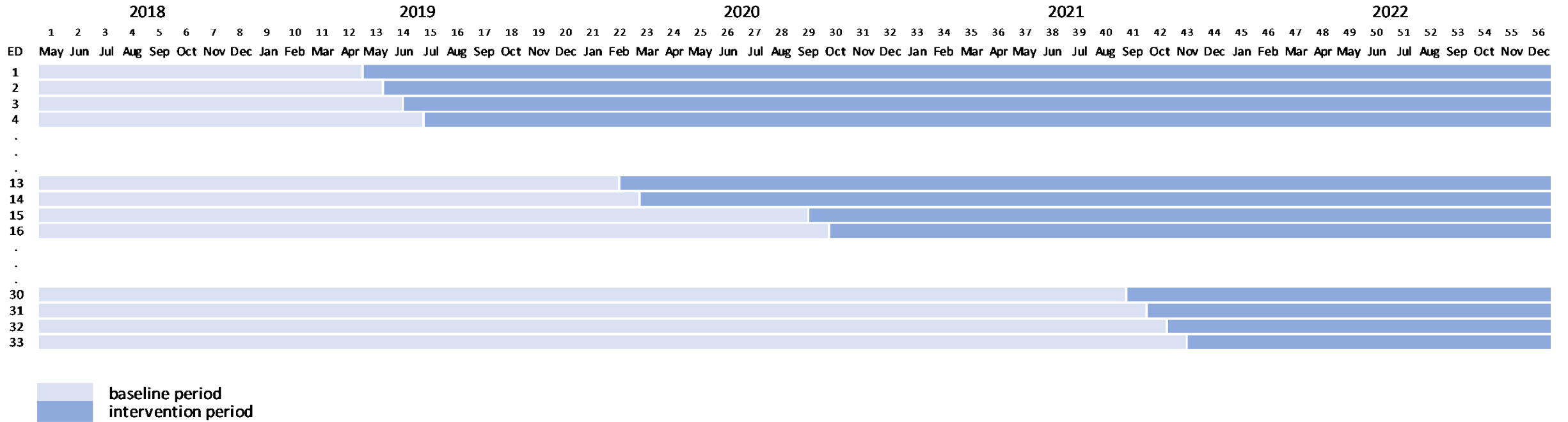
Hypothesis

- PRIM-ER will reduce ED disposition to acute care and 6-month healthcare use for older adult patients with serious, life-limiting illness

18 Health Systems/33 EDs



Randomization



Primary and Secondary Outcomes

Variable	Instrument/Coding	Source	Time
Acute Care Admission	Yes/No (Inpatient, non-palliative admission)	Inpatient and Outpatient Research Identifiable Files (RIF)	Index ED visit
ED Revisit	Count & Yes/No	Inpatient and Outpatient RIF	Up to 6 months from index ED visit
Inpatient Days	Count & Yes/No	Inpatient RIF	Up to 6 months from index ED visit
Hospice Use	Yes/No	Hospice RIF	Up to 6 months from index ED visit
Home Health Use	Yes/No	Home Health RIF	Up to 6 months from index ED visit
Survival	Days (Count) & Yes/No	Vital Status RIF	Up to 6 months from index ED visit or death

*Primary and secondary outcomes to be measured as change in measures from baseline to 4 weeks post-implementation for UH3 Phase, Aim 3.

Inclusion & Exclusion Criteria

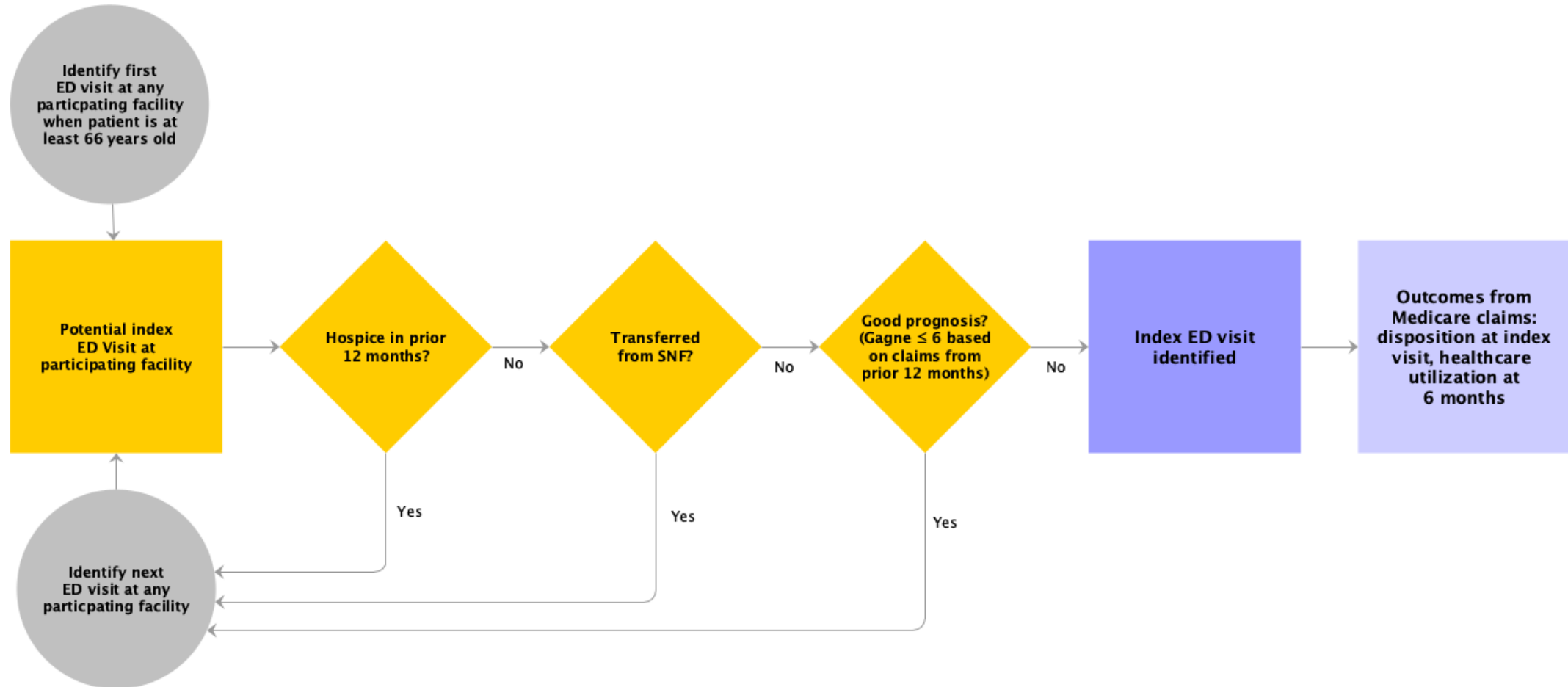
ED Visit Inclusion Criteria

- ED visit to participating site during study period
- 66 years or older
- One-year mortality of at least 30 percent (score >6 on Gagne Index)

ED Visit Exclusion Criteria

- Reside in nursing facility
- Hospice use

Identifying ED visits in Medicare claims



Analytic Plan

Model

$$\text{logit} [P(A_{ijt} = 1)] = \beta_0 + \beta_1 P_t + \delta_0 I_{jt} + \delta_1 P_t I_{jt} + s(t) + q_j(t)$$

- Generalized Additive Model
- Baseline (control), transition (3-week implementation) and follow-up (intervention) period
- Assumed full and immediate intervention effect
- To account for the impact of the COVID-19, added a pandemic-period indicator

Exploratory analyses

- Assess the effect of ED-level characteristics on the primary and secondary outcomes
- Individual level models of the primary and secondary outcomes that account for ED- and individual-level effects

Implementation Analyses

Pre-implementation

- **Go/No-Go** criteria for UH3 transition based on feasibility, acceptability and usability

Post-implementation

- Quantitative and qualitative course evaluations
- Site survey
- Semi-structured key informant interviews
- Audit and feedback form

Results: Implementation

Overall

As of 12/6/21 all 33 sites completed all components of the intervention

- 3892 emergency practitioners were randomized, 2470 participated

Components

- Train 75% of emergency providers on **EM Talk and EPEC-EM**
 - 32/33 sites reached goal
- Train 75% of emergency nurses on **ELNEC**
 - 30/33 sites reached goal
- Implement a **Clinical Decision Support (CDS)**
 - 33/33 sites reached goal and kept CDS through August 2023
- Conduct **Audit and Feedback**
 - 33/33 sites reached goal

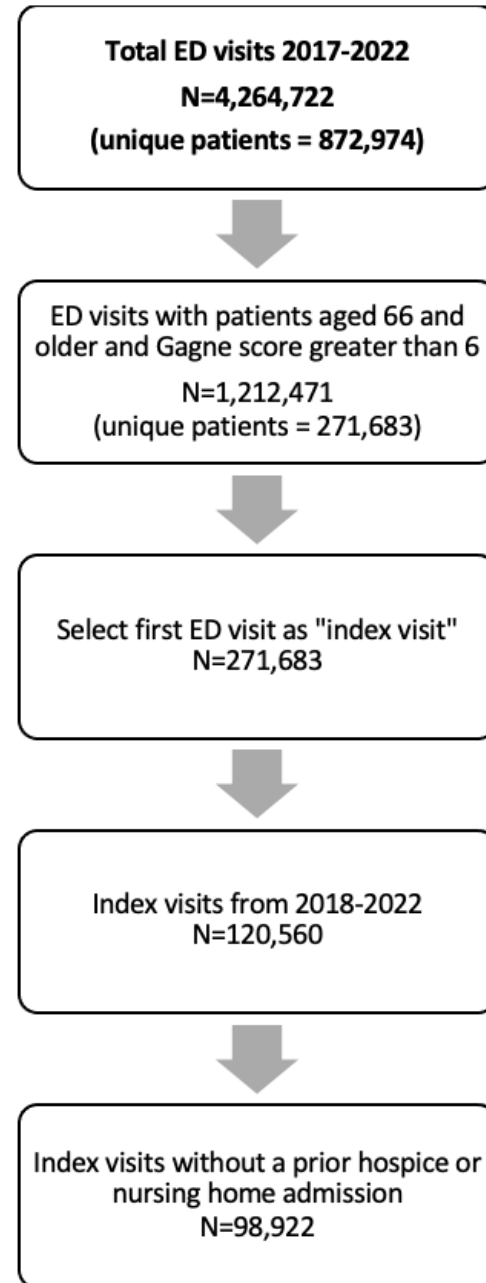
CDS Overall Implementation

- **Summary**
 - 17 (52%) sites implemented more than 1 best practice alert/banner
 - 16 (48%) sites implemented only 1 best practice alert/banner
 - 3/16 (19%) ACP Present
 - 6/16 (38%) Hospice
 - 7/16 (44%) Serious Life-limiting Illness without ACP
 - 11 (33%) sites implemented a banner (as opposed to best practice alert)
 - 12 (36%) sites implemented all three best practice alerts/banners
- **Total Breakdown via Alert**
 - ACP document present
 - 19/33 (58%) sites
 - Hospice
 - 20/33 (61%) sites
 - Serious Life-limiting illness without ACP
 - 23/33 (70%) sites

Clinician Characteristics

Variable (N=2,994)	Frequency (%)
Age Categories	
Less than 30 years	654 (21.8)
30 – 39 years	1,114 (37.2)
40 – 49 years	650 (21.7)
50 – 59 years	399 (13.3)
60 years and older	138 (4.6)
Not Reported	39 (1.3)
Sex	
Male	926 (30.9)
Female	2,026 (67.7)
Not Reported	42 (1.4)
Race/Ethnicity	
Non-Hispanic White	2,061 (68.8)
Non-Hispanic Black	168 (5.6)
Hispanic	174 (5.8)
Other Races	568 (19.0)
Not Reported	23 (0.8)
Provider Type	
Nurses	1,998 (66.7)
Nurse Practitioners	59 (2.0)
Physician Assistants	186 (6.2)
Physicians	723 (24.1)
Others/Not Reported	28 (1.0)
Years of Practice	
Less than 2 years	362 (12.1)
2 – 5 years	716 (23.9)
6 – 10 years	728 (24.3)
11 – 15 years	452 (15.1)
More than 15 years	713 (23.8)
Not Reported	23 (0.8)

CONSORT diagram



Patient characteristics

	Overall (N=98922)
Age	
Mean (SD)	78.0 (8.42)
Age in Categories	
66-69	19178 (19.4%)
70-74	20722 (20.9%)
75-79	19011 (19.2%)
80-84	16063 (16.2%)
85+	23948 (24.2%)
Sex	
Female	49041 (49.6%)
Male	49881 (50.4%)
Race/ethnicity	
White	76950 (77.8%)
Black	13347 (13.5%)
Hispanic	1462 (1.5%)
Asian	2788 (2.8%)
Other	4375 (4.4%)
Gagne score	
Mean (SD)	8.98 (2.19)
COVID period	
Pre-COVID	43716 (44.2%)
COVID	55206 (55.8%)

Patient characteristics

	Overall (N=98922)	Baseline (N=51611)	Follow-up (N=47311)	SMD
Age				0.063
Mean (SD)	78.0 (8.42)	78.2 (8.49)	77.7 (8.34)	
Age in Categories				0.075
66-69	19178 (19.4%)	9639 (18.7%)	9539 (20.2%)	
70-74	20722 (20.9%)	10526 (20.4%)	10196 (21.6%)	
75-79	19011 (19.2%)	9720 (18.8%)	9291 (19.6%)	
80-84	16063 (16.2%)	8531 (16.5%)	7532 (15.9%)	
85+	23948 (24.2%)	13195 (25.6%)	10753 (22.7%)	
Sex				0.013
Female	49041 (49.6%)	25741 (49.9%)	23300 (49.2%)	
Male	49881 (50.4%)	25870 (50.1%)	24011 (50.8%)	
Race/ethnicity				0.035
White	76950 (77.8%)	39983 (77.5%)	36967 (78.1%)	
Black	13347 (13.5%)	7100 (13.8%)	6247 (13.2%)	
Hispanic	1462 (1.5%)	744 (1.4%)	718 (1.5%)	
Asian	2788 (2.8%)	1567 (3.0%)	1221 (2.6%)	
Other	4375 (4.4%)	2217 (4.3%)	2158 (4.6%)	
Gagne score				0.072
Mean (SD)	8.98 (2.19)	8.90 (2.14)	9.06 (2.25)	
COVID period				1.873
Pre-COVID	43716 (44.2%)	39499 (76.5%)	4217 (8.9%)	
COVID	55206 (55.8%)	12112 (23.5%)	43094 (91.1%)	

'Other' race includes North American Native, Other, and Unknown

Disposition to Acute Care, by site and month



Disposition to Acute Care, model results

	Model 1			Model 2		
	Est.	S.E	95% CI	Est.	S.E	95% CI
Intercept	1.30	0.11	[1.11, 1.53]	0.42	0.05	[0.34, 0.53]
COVID period	1.36	0.09	[1.19, 1.55]	1.37	0.09	[1.20, 1.56]
Transition period	0.88	0.07	[0.76, 1.03]	0.90	0.07	[0.77, 1.05]
FU period	1.04	0.06	[0.93, 1.15]	1.04	0.06	[0.94, 1.16]
COVID * Transition period	1.17	0.12	[0.95, 1.44]	1.16	0.12	[0.94, 1.43]
COVID * FU period	0.94	0.05	[0.84, 1.05]	0.94	0.05	[0.84, 1.06]
Age (10-year increments)				1.07	0.01	[1.06, 1.09]
Black				0.82	0.02	[0.79, 0.86]
Hispanic				0.79	0.04	[0.71, 0.88]
Asian				1.09	0.05	[1.01, 1.19]
Other race				0.93	0.03	[0.87, 0.99]
Male				1.09	0.01	[1.06, 1.12]
Prognosis				1.06	0.00	[1.06, 1.07]

'FU' = Follow-Up

Disposition to Acute Care, exploratory results

	Model 3		
	Est.	S.E	95% CI
Intercept	0.19	0.38	[0.00, 9.22]
Female providers (proportion)	4.62	9.72	[0.07, 286.72]
White providers (proportion)	0.97	0.88	[0.16, 5.78]
Providers 10+ yrs (proportion)	0.51	0.62	[0.05, 5.44]
ED Ownership: Government	0.56	0.76	[0.04, 8.04]
ED Ownership: Non-Profit	1.06	0.72	[0.28, 4.01]
ED Residency Training	0.90	0.41	[0.37, 2.19]
ED Social Worker	1.23	0.48	[0.57, 2.65]
ED Region: Northeast	2.16	0.71	[1.14, 4.12]
ED Region: Southeast	1.55	1.07	[0.40, 5.99]
ED Region: West	3.08	2.48	[0.63, 14.91]
ED Metropolitan	1.48	0.54	[0.73, 3.02]
ED Outpatient Palliative Care	0.84	0.40	[0.33, 2.14]
ED EHR: EPIC	1.20	0.50	[0.53, 2.73]
ED Trauma Center	1.46	0.59	[0.66, 3.20]
ED Volume (divided by 1000)	1.00	0.01	[0.98, 1.01]
COVID period	1.33	0.08	[1.18, 1.50]
Transition period	0.97	0.05	[0.87, 1.07]
FU period	1.00	0.04	[0.92, 1.08]

'FU' = Follow-Up

Secondary outcomes, unadjusted and adjusted

	Unadjusted Statistics			Model Summary		
	Overall (N=98,922)	Baseline (N=51,611)	Follow-up (N=47,311)	Est.	S.E.	95% CI
ICU admissions (Yes/No)	7,168 (7.2%)	3,977 (7.7%)	3,191 (6.7%)	0.98	0.08	[0.83, 1.15]
ED re-visits (Yes/No)	32,851 (33.2%)	17,793 (34.5%)	15,058 (31.8%)	1.00	0.05	[0.91, 1.09]
ED re-visits (Count)	0.62 (1.64)	0.66 (1.8)	0.57 (1.43)	0.84	0.04	[0.77, 0.93]
IP admissions (Yes/No)	38,408 (38.8%)	21,184 (41%)	17,224 (36.4%)	1.01	0.04	[0.92, 1.10]
IP admissions (Count)	0.63 (1.02)	0.68 (1.06)	0.57 (0.96)	0.94	0.03	[0.87, 1.00]
Hospice (Yes/No)	17,299 (17.5%)	9,049 (17.5%)	8,250 (17.4%)	1.04	0.06	[0.93, 1.16]
Home Health (Yes/No)	39,638 (40.1%)	21,668 (42%)	17,970 (38%)	1.01	0.04	[0.92, 1.10]
Death (Yes/No)	28,063 (28.4%)	14,383 (27.9%)	13,680 (28.9%)	1.07	0.05	[0.98, 1.18]
Death (days from index)	17.18 (38.23)	17.19 (38.65)	17.17 (37.76)	1.00	0.04	[0.93, 1.08]

Death (days from index) calculated using the subset of patients who died. Interpretation of effect size estimates vary based on outcome measurement: binary outcomes (Yes/No) interpreted as odds ratios, count outcomes interpreted as rate ratios, and time to death (days from index) interpreted as a hazard ratio.

Adoption and Maintenance of Alerts

All 33 sites responded to post-implementation survey

- 28/33 (85%) say alerts are sustainable
- 26/33 (79%) plan to continue use

Facilitators

Hospice alert was popular and valued

- *“We should know if the patient is on hospice right away because that will really change what I order in the ED. If I know they’re hospice, I might even consider if they really need the CT.”*

ED providers utilized tools when they felt it was part of their job

- *“If someone has metastatic cancer and has exhausted their options and is coming in for a pneumonia, we need to make sure we have that conversation.”*

Barriers

Goals of care trigger could be too sensitive

- *“Let’s say you have a 78-year-old with an ankle fracture, maybe a lot of comorbidities. Even though the patient meets criteria for the trigger, it may not be the right time to have a goals of care conversation.”*

Too much text on the alert

- *“Emergency physicians have short attentions spans. It’s a balance of giving enough information but not too much so that people will not just close it.”*

Conclusions

- A multi-level, complex primary palliative care intervention in 33 EDs did not decrease acute care disposition in older adults at high risk for short-term mortality, but reduced ED revisits at 6 months
- Nurses and providers are willing and able to use new skills, especially those deemed clinically relevant
- Electronic CDS tools must be thoughtfully tailored to unique workflows and environments

Limitations

- Stepped wedge design subject temporal trends
 - Limited communication skills trainers to deliver intervention across multiple sites simultaneously
- Staff turnover
 - Limited resources to train and re-train clinicians
- COVID-19 pandemic
- Inability to identify free-standing EDs in Medicare claims

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