ORIGINAL RESEARCH

Intervention to Improve Care at Life's End in Inpatient Settings: The BEACON Trial

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BACKGROUND: Widespread implementation of palliative care treatment plans could reduce suffering in the last days of life by adopting best practices of traditionally home-based hospice care in inpatient settings.

OBJECTIVE: To evaluate the effectiveness of a multimodal intervention strategy to improve processes of end-of-life care in inpatient settings.

DESIGN: Implementation trial with an intervention staggered across hospitals using a multiple-baseline, stepped wedge design.

PARTICIPANTS: Six Veterans Affairs Medical Centers (VAMCs).

INTERVENTION: Staff training was targeted to all hospital providers and focused on identifying actively dying patients and implementing best practices from home-based hospice care, supported with an electronic order set and paper-based educational tools.

MAIN MEASURES: Several processes of care were identified as quality endpoints for end-of-life care (last 7 days) and abstracted from electronic medical records of veterans who died before or after intervention ($n=$ 6,066). Primary endpoints were proportion with an order for opioid pain medication at time of death, do-not-resuscitate order, location of death, nasogastric tube, intravenous line infusing, and physical restraints. Secondary endpoints were administration of opioids, order/administration of antipsychotics, benzodiazepines, and scopolamine (for death rattle); sublingual administration; advance directives; palliative care consultations; and pastoral care services. Generalized estimating equations were conducted adjusting for longitudinal trends.

KEY RESULTS: Significant intervention effects were observed for orders for opioid pain medication (OR: 1.39), antipsychotic medications (OR: 1.98), benzodiazepines (OR: 1.39), death rattle medications (OR: 2.77), sublingual administration (OR: 4.12), nasogastric tubes (OR: 0.71), and advance directives (OR: 1.47). Intervention effects were not significant for location of death, do-not-resuscitate orders, intravenous lines, or restraints.

CONCLUSIONS: This broadly targeted intervention strategy led to modest but statistically significant changes in several processes of care, indicating its potential for widespread dissemination to improve end-of-life care for thousands of patients who die each year in inpatient settings.

INTRODUCTION

At life's end, most people experience physical suffering, as well as significant emotional, spiritual, and social distress.[1–7] Often, patients are not recognized as actively or imminently dying,[1, 8–14] and their suffering may be exacerbated by usual medical care, in which intensive or iatrogenically harmful treatments frequently are continued.[15–18] During this time, palliative care treatment plans can be implemented, in place of or in addition to existing care plans, to reduce suffering and improve end-of-life care.[12, 19, 20]

Despite the benefits of palliative care[18–25] and its growth in recent years,[20, 25, 27] it is not always available for inpatients, partly because the subspecialty palliative care workforce is not currently sufficient to reach all patients dying in hospital

settings and partly because practitioners do not recognize shifts in patient trajectory indicating the need for palliative care consultation.[26–32] In an environment focusing on "cure," transition away from disease-modifying treatments to symptom control can seem counterintuitive. Because most Americans are likely to die in a hospital or nursing home,[20, 33, 34] there is a compelling need to address processes of care for actively dying patients in inpatient settings.

This article describes the Best Practices for End-of-Life Care for Our Nation's Veterans (BEACON) trial (see Online Appendix), a multi-center implementation trial of an intervention strategy to improve the quality of end-of-life care in acute care settings. The multicomponent intervention included training hospital staff to identify actively dying patients, communicate the prognosis to patients/families, and implement best practices of traditionally home-based hospice care in the inpatient setting. The intervention was supported with an electronic order set and other educational tools to prompt and guide implementation. The primary aim of this study was to evaluate the effectiveness of this intervention for improving processes of care provided in the last days of life in Veterans Affairs Medical Centers (VAMCs).

METHODS

Design

The BEACON study was a real-world, multi-site implementation trial. A multiple-baseline, stepped wedge design was used, in which the intervention was initiated sequentially across sites, separated by 6-month intervals.[35] Data on processes of end-of-life care before and after intervention were derived from the electronic medical records (EMRs) of deceased veterans.

Sites

Six VAMCs participated in the trial. The sites were identified based on geographic proximity to the coordinating center and availability of an Institutional Review Board. All identified sites agreed to participate and provided letters of agreement/support from the Medical Center Director. All participating VAMCs were affiliated with academic medical centers. The study received Institutional Review Board approval at each site and the coordinating center. The order in which the sites received intervention was determined by order of recruitment and readiness.

Multi-modal intervention strategy

The multi-modal intervention strategy was designed and pilot tested at the coordinating center prior to initiating the

trial.[36] Intervention was targeted to VAMC inpatient providers and consisted of preparatory site visits, a staff education program supported with printed educational tools, a newly developed Comfort Care order set (CCOS) decision support tool built into the EMR, and follow-up consultation (Table 1). Consistent with the Promoting Action on Research Implementation in Health Services (PARiHS) framework,[37] the intervention included elements of facilitation to provide tools, resources, and strategies to fully implement best practices and incorporate them into routine clinical practice. Intervention materials are available on the UAB Center for Palliative and Supportive Care website at the following link, http://www.uab.edu/medicine/palliativecare/training/beacon, and in the e-appendix (see Online Appendix).

Preparatory site visits. The interventionists visited each site to orient leadership and understand local context. They met with the Palliative Care Consult Team (PCCT), a VA-mandated team consisting of a physician, nurse, social worker, and chaplain at each medical center. Train-the-trainer sessions were conducted to review implementation strategies and prepare the PCCT to serve as ongoing resources to their institutions.

To develop the infrastructure to support implementation, the interventionists met with key representatives of administration, nursing services, pharmacy, social work, pastoral care, and information resource management. Activities included coordinating with local staff to incorporate the CCOS into the EMR and ensuring the availability of medications needed for comfort care. The interventionists provided assistance with policies, procedures, and skill training needed to implement comfort care interventions. For example, pharmacy policy was added to enable availability of sublingual medications, and nursing policy was altered to include procedures for subcutaneous medication administration.

Staff training program. The interventionists traveled to each site to conduct 2 weeks of staff education targeting all physicians, nurses, chaplains, social workers, dieticians, pharmacists, and other staff throughout the hospital. Members of the Palliative Care Consult Team received intensive training, including recognizing actively dying patients, communicating prognoses to patients/families, implementing Comfort Care interventions, and serving as local trainers and champions in the post-intervention period and beyond.

Physician and resident training was conducted primarily during teaching rounds on the inpatient units. Teaching utilized presentations from *The Palliative Response*,[38] a module-based guide to palliative care interventions (available at http://www.uab.edu/medicine/palliativecare/training/palliative-response). As part of the intervention, the on-site PCCT members were trained to teach the intervention and charged to

Table 1. Components of the BEACON intervention

Component	Purpose	Activities	Materials
Preparatory site visits	Orient leadership	Presentations and meetings with administrative leaders	Sample policies and procedures
	Orient Palliative Care Consult Team (physician, nurse, social worker, chaplain)	Presentations, training	*The Palliative Response* (module-based guide) Pocket cards Sample policies and procedures
	Coordinate with Pharmacy to ensure availability of medications	Presentations, training Assistance with policy changes	Sample policies and procedures
Comfort Care Order Set (CCOS)	Decision support tool designed to facilitate provider behavior change	Order set built into EMR system at each site	Screenshots of order set in EMR system
Staff Training program	Teach staff to identify actively dying patients and communicate prognosis to patients/family	Inpatient teaching rounds Morning report Small group sessions Academic detailing	*The Palliative Response* (module-based guide) Pocket card: Identifying the Actively Dying Patient
	Teach staff to implement Comfort Care interventions and navigate the CCOS	Inpatient teaching rounds Morning report Small group sessions Academic detailing	Screenshots of order set in EMR system CCOS pocket cards
	Train PCCT to teach future residents and physicians	Small group sessions Demonstration by implementation team	*The Palliative Response* and pocket cards
Follow-up consultation	Maintain provider behavior change	Trainers available to answer questions for duration of 4-month training period	Additional copies of *The Palliative Response* and pocket cards as needed

present the content, so that it could be conveyed to incoming residents and new physicians. To reach other clinical staff, the interventionists circulated through the hospital using academic detailing techniques.[39, 40] To present all key information to as many staff as possible, sessions were presented on different inpatient units during all shifts.

Initially, training focused on developing skills to identify patients who are entering the dying process[9] and should be evaluated for problems with symptom management that may be addressed by the CCOS. A pocket card was developed, "Identifying the Actively Dying Patient," that included simple criteria for case identification derived from the literature and observation.[41, 42] Staff received training in several Comfort Care interventions derived from the best practices for hospice care and modified for use in the inpatient care setting.[12, 43–45] The interventions were based on the American Board of Medical Specialty guidelines and core principles for clinical policy and professional practice in end-of-life care, subsequently endorsed by the National Quality Forum Consensus standards for Palliative Care and End-of-Life Care.[46, 47] Other pocket cards were used to guide calculation of pain medication doses and reinforce communication techniques.

Comfort Care Order Set (CCOS). To facilitate implementation of the Comfort Care interventions, the protocols were organized into a CCOS that was integrated into the EMR at each site. Orders could be customized for individual patients, and any or all of the orders could be selected and integrated into existing care plans. To overcome physician reluctance to abandon disease-modifying therapies, the CCOS was designed for use in conjunction with these therapies, with no requirement to discontinue any other treatments.

Measurement

Using a chart abstraction tool designed for the study, a registered nurse derived data on processes of end-of-life care (last 7 days) from the electronic and paper records of veterans who died as inpatients in acute and long-term care units of the participating VAMCs during the study (January 2005 through February 2011). To balance the size of the clusters, we included all deaths before and after the intervention in five of the hospitals and a random sample of deaths that occurred in the largest hospital. Inter-rater reliabilities for the primary outcome measures were established between the chart abstractor and the Director of Palliative Care at the coordinating center.

A priori, several processes of care were identified as primary and secondary endpoints to indicate quality of end-of-life care[48] (Table 2) The process of writing an opioid

Table 2. Process of care endpoints

Primary endpoints
    Opioid order present
    Do-not-resuscitate order (present)
    Location of death (not ICU)
    Nasogastric tube (absent)
    Intravenous line infusing (absent)
    Restraints (absent)
Secondary endpoints
    Opioid given
    Antipsychotic ordered
    Antipsychotic given
    Benzodiazepine ordered
    Benzodiazepine given
    Medication for death rattle
    Palliative care consultation
    Pastoral care visits
    Advance directive
    Sublingual administration

order was chosen as the first endpoint because of the importance of pain management at end of life. We selected presence of an order rather than administration as the primary endpoint, because not every patient will need the medication. However, the process of making it available by maintaining an active order is a quality indicator, because it enables prompt relief of emerging symptoms. Other variables abstracted were diagnoses, locations of care within the medical center, and length of stay. Demographic data were obtained from VA national datasets.

Power

A simulation study was designed to estimate statistical power for a design in which six hospitals were under investigation, the average probability of dying with an opioid order was 0.55 pre-intervention and 0.70 post-intervention, and the intraclass correlation coefficient was 0.01. To meet these assumptions, pre-intervention probabilities among the hospitals were sampled from a beta distribution with $a=44.55$, $b=54.55$, and post-intervention probabilities were sampled from a beta distribution with $a=9.7$, $b=69.3$. In the absence of power formulas for generalized estimating equations (GEE), 1,000 simulations were conducted generating 240 observations per hospital (120 pre/120 post) for 6 hospitals. The simulations indicated power to be 92.6 % assuming a type I error rate of 0.05. Simulations were conducted in SAS 9.1 and included recommended degrees of freedom adjustment for small numbers of clusters.

Statistical analysis plan

Preliminary unadjusted statistical analyses compared the proportions of patients who experienced each of the processes of care in the 12 months before and the 12 months after intervention using GEE.[49] Careful adjustment of the degrees of freedom was conducted to account for the known issues of using GEE with small numbers of clusters.[50–53]

During the trial, the investigative team was cognizant of the possibility of secular trends, changes in palliative care attributable to initiatives other than our intervention, that could bias or confound intervention estimates. Therefore, records were abstracted across the entire 6-year study period for all hospitals. Because of the staggering of intervention, the hospitals had different lengths of baseline and follow-up, but data were collected for all 6 years at all 6 sites. The inclusion of data from the entire study period enabled examination of intervention effects while adjusting for any longitudinal trends that might be found. These models included a time variable, a variable representing whether the hospital had received the intervention yet, and a time by intervention interaction term. Because the interaction term did not achieve significance across any outcome, the final models included variables measuring the effect of time and intervention. The models were not adjusted for covariates such as demographics or terminal conditions. Data were analyzed using SAS 9.3.

RESULTS

Fidelity

Each of the components in Table 1 was delivered to all sites. Sign-in sheets documented that training was attended by at least 1,621 staff, including 131 physicians, residents, and medical students; 66 physician assistants and nurse practitioners, 943 nurses; 135 nursing assistants and students; 53 social workers; 24 chaplains; 100 pharmacy staff; 5 mental health staff; 24 respiratory therapists; 15 dietary staff; 54 other allied health professionals; 44 administrative staff; and 27 other staff.

Characteristics of deceased veterans

The medical records of 6,066 veterans who died in the VAMCs during the study period were abstracted. Table 3 presents the characteristics of the total sample across all 6 years, as well as the subset of 2,213 veterans who died 12 months before and 12 months after intervention. There were no significant differences in patient characteristics between the pre- and post-intervention groups for either sample.

Changes in processes of care

Changes were in the desired direction for all 16 variables. Longitudinal (secular) trends were found to be significant only for the proportions of patients dying with a DNR order (OR: 1.06; 95 % CI: 1.02-1.10) or an order for death rattle medication (OR: 1.16; CI: 1.07-1.24). After adjusting for these longitudinal trends, the intervention effects were significant for the proportion of patients dying with an active opioid order, with an antipsychotic order, and with an order for death rattle medication (Table 4, Fig. 1). In

Table 3. Patient characteristics

	Total sample			12 months pre- and post-intervention subset		
	Total (*N*=6,066)	Pre-intervention (*N*=3,243)	Post-intervention (*N*=2,823)	Total (*N*=2,213)	12 months pre-intervention (*N*=1,081)	12 months post-intervention (*N*=1,132)
Demographic variables						
Site (n, %)						
#1	1,152 (19.0)	905 (27.9)	247 (8.8)	364 (16.5)	215 (19.9)	149 (13.2)
#2	887 (14.6)	437 (13.5)	450 (15.9)	421 (19.0)	193 (17.9)	228 (20.1)
#3	992 (16.4)	569 (17.6)	423 (15.0)	238 (10.8)	118 (10.9)	120 (10.6)
#4	745 (12.3)	127 (3.9)	618 (21.9)	322 (14.6)	146 (13.5)	176 (15.6)
#5	1,254 (20.7)	880 (27.1)	374 (13.3)	467 (21.1)	244 (22.6)	223 (19.7)
#6	1,036 (17.1)	325 (10.0)	711 (25.2)	401 (18.1)	165 (15.3)	236 (20.9)
Age, in years (mean, SD)	71.2 (12.0)	71.7 (12.1)	70.7 (11.8)	71.3 (11.9)	71.2 (11.9)	71.4 (11.9)
Race (n, %)						
Hispanic white	8 (0.2)	7 (0.2)	1 (0.0)	3 (0.2)	2 (0.2)	1 (0.1)
Hispanic black	2 (0.0)	0 (0.0)	2 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
Native American	4 (0.1)	3 (0.1)	1 (0.0)	1 (0.1)	0 (0.0)	1 (0.1)
Black	1876 (34.6)	1049 (34.7)	827 (34.5)	672 (34.4)	336 (34.5)	336 (34.2)
Asian	1 (0.0)	1 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
White	3528 (65.1)	1965 (64.9)	1563 (65.2)	1278 (65.3)	634 (65.2)	644 (65.5)
Native Hawaiian/ Pacific Islander	4 (0.1)	1 (0.0)	3 (0.1)	2 (0.1)	1 (0.1)	1 (0.1)
Gender						
Male	5,812 (98.2)	3,180 (98.2)	2,632 (98.1)	2,130 (98.1)	1,059 (98.0)	1,071 (98.2)
Female	109 (1.8)	58 (1.8)	51 (1.9)	42 (1.9)	22 (2.0)	20 (1.8)
Most recent income						
Below $10,000	2,016 (35.3)	1,150 (37.5)	866 (32.8)	770 (36.5)	414 (39.6)	356 (33.4)
$10,000-$19,999	1,647 (28.9)	880 (28.7)	767 (29.1)	587 (27.8)	267 (25.6)	320 (30.0)
$20,000-$29,999	783 (13.7)	473 (15.4)	310 (11.8)	267 (12.7)	144 (13.8)	123 (11.5)
$30,000 or more	1,259 (22.1)	563 (18.4)	696 (26.4)	487 (23.1)	220 (21.1)	267 (25.1)
Clinical characteristics						
Terminal condition						
Cancer	1,845 (30.4)	913 (28.2)	932 (33.0)	732 (33.1)	362 (33.5)	370 (32.7)
Dementia	618 (10.2)	369 (11.4)	249 (8.8)	208 (9.4)	108 (10.0)	100 (8.8)
Lung disease	484 (8.0)	250 (7.7)	234 (8.3)	186 (8.4)	84 (7.8)	102 (9.0)
Heart disease	1,165 (19.2)	645 (19.9)	520 (18.4)	430 (19.4)	202 (18.7)	228 (20.1)
Kidney disease	306 (5.0)	158 (4.9)	148 (5.2)	106 (4.8)	51 (4.7)	55 (4.9)
Liver disease	335 (5.5)	171 (5.3)	164 (5.8)	115 (5.2)	64 (5.9)	51 (4.5)
Stroke	451 (7.4)	255 (7.9)	196 (6.9)	146 (6.6)	61 (5.6)	85 (7.5)
HIV	93 (1.5)	52 (1.6)	41 (1.5)	36 (1.6)	19 (1.8)	17 (1.5)
Acute illness	345 (5.7)	165 (5.1)	180 (6.4)	116 (5.2)	57 (5.3)	59 (5.2)
None/unexpected	424 (7.0)	265 (8.2)	159 (5.6)	138 (6.2)	73 (6.8)	65 (5.7)
Length of stay						
<24 h	376 (6.2)	227 (7.0)	149 (5.3)	136 (6.2)	62 (5.7)	74 (6.5)
>24 h but <7 days	2,321 (38.3)	1,257 (38.8)	1,064 (37.7)	873 (39.5)	424 (39.2)	449 (39.7)
≥7 days	3,369 (55.5)	1,759 (54.2)	1,610 (57.0)	1,204 (54.4)	595 (55.0)	609 (53.8)

Table 4. Effects of intervention on processes of care adjusting for 6-year longitudinal trends. *N*=6,066

| Variable	Pre-intervention (%) *n*=3,243	Post-intervention (%) *n*=2,824	95 % confidence interval	*p*-value
Opioid ordered	61.8	72.8	1.39 (1.09 – 1.76)	0.009
Opioid given	48.4	58.9	1.36 (0.95 – 1.96)	0.09
Do-not-resuscitate order	70.4	75.3	1.11 (0.87 – 1.42)	0.40
Death in intensive care unit	40.5	37.0	0.92 (0.59 – 1.42)	0.69
Nasogastric tube	39.9	32.7	0.71 (0.53 – 0.96)	0.03
Intravenous line infusing	69.6	58.5	0.66 (0.38 – 1.16)	0.15
Restraints	16.4	12.8	1.04 (0.67 – 1.62)	0.86
Palliative care consultation	17.2	31.3	2.45 (0.62 – 9.70)	0.19
Antipsychotic ordered	10.4	23.4	1.98 (1.17 – 3.36)	0.01
Antipsychotic given	6.9	9.9	1.31 (0.73 – 2.35)	0.36
Benzodiazepine ordered	34.0	42.0	1.39 (1.08 – 1.77)	0.01
Benzodiazepine given	21.9	23.9	0.95 (0.70 – 1.30)	0.76
Medication for death rattle	3.5	22.4	2.77 (1.41 – 5.44)	0.004
Pastoral care visits	50.3	62.5	1.64 (0.84 – 3.20)	0.14
Advance directive	36.8	46.3	1.47 (1.15 – 1.88)	0.003
Sublingual administration	3.8	11.4	4.12 (1.51 – 11.28)	0.007
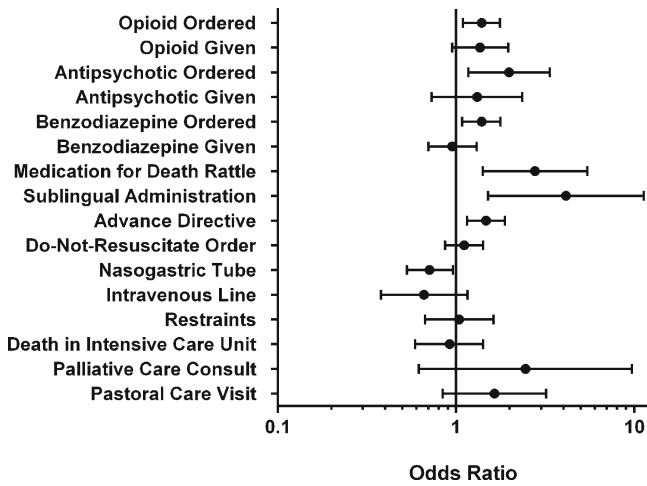
Figure 1. Odds ratios and 95 % confidence intervals for process of care endpoints adjusting for longitudinal trends (ICU=intensive care unit)

addition, statistically significant intervention effects were found for presence of advance directives, nasogastric tube, benzodiazepine order, and sublingual administration.

DISCUSSION

We only die once, and there is only one opportunity to provide excellent care to a patient in the last days of life. The keys to excellent end-of-life care are recognizing the imminently dying patient, communicating the prognosis, identifying goals of care, and anticipating and palliating symptoms. Since it is not possible to predict with certainty which symptoms will arise, it is prudent to have a flexible plan taking into account practical issues, such as loss of the oral or intravenous route for medication. The results show significant changes in several processes of care after intervention, including orders for opioid pain medication and orders for antipsychotic, benzodiazepine, and death rattle medications, sublingual administration, absence of nasogastric tubes, and presence of advance directives, indicating a more comprehensive plan to meet the anticipated distress of patients and families in the last hours of life.

A primary goal of the BEACON intervention was to increase availability and proper use of opioid medications in the inpatient setting. The first step in implementing this process of care is to ensure that a physician's opioid order is in effect. It would be ideal for all patients to have orders for opioids so that nursing staff could respond promptly to common emergent symptoms rather than having to call for medication orders, which often delays symptom relief. The increase in opioid orders seen in this study is consistent with previous studies showing successful implementation of palliative care order sets in VA and non-VA hospitals.[36, 54, 55]

The improvement in orders for antipsychotics is important because it probably indicates increased recognition and treatment of terminal delirium, which affects up to 85 % of patients during the dying process.[56] Delirium increases risk of injury, causes difficulty with feeding and delivering medication, and often results in use of restraints. The most appropriate medications for terminal delirium are low-dose antipsychotics. The uptake of the use of medications for rattling respirations is also important because of the distress it causes families and staff. Taken together, these changes represent the development of proactive plans that empower nursing to better control distressing symptoms such as pain, dyspnea, delirium, and secretions with rattling respirations.

Use of intravenous lines and nasogastric tubes is common at the end of life in hospitalized patients and is negatively associated with quality of life.[57] We achieved a reduction in the use of nasogastric tubes. We were also able to increase use of the sublingual route. The lack of reduction in intravenous lines could be due to continuation of a routine route of medication administration in hospitalized patients. Physicians routinely order intravenous medications and tend to continue to use this route, even when less burdensome routes are available.

Observed changes were not statistically significant for reducing deaths in ICUs by shifting location of death to other less restrictive locations. This may be due to recent patient-centered practice changes in ICU settings,[22, 58, 59] including permitting longer and more frequent family presence. Transfer to other settings may be advisable in fewer cases, as it may move the patient away from providers who know them well. Further, while the patient may not benefit from the technologically advanced treatments in the ICU, they may benefit from the intensive nursing care, particularly with a palliative care plan in place.

Although changes were observed in some important processes of care, they were modest in magnitude and smaller than what had been achieved in our pilot study.[36] This speaks to the difficulty of changing practice patterns of large groups of providers on an institutional level.[1, 60–62] While the intervention team trained hundreds of people at each medical center, many staff had very little contact with the trainers (≤ an hour), which may have diluted the intervention effects. In addition, staff training lasted only 2 weeks. Efforts were made to use the PCCT members as champions to facilitate and sustain change over time, and follow-up consultation was available. However, this may not have been sufficient for optimal culture change.

Larger changes might be achieved with an expanded model of implementing the BEACON intervention. Future efforts are needed to increase the intensity of the train-the-trainer model to provide local PCCTs with more in-depth training, empowering them to train other providers at their institutions. This approach has potential to provide institutions with a consistent presence of champions working to

promote new practice patterns. Nevertheless, the changes seen in this study were based on a large denominator, indicating that hundreds of patients received better care following intervention. This becomes significant when considering the potential impact on over 700,000 patients who die each year in hospitals nationwide.[63]

Strengths of this study include the large number of patient cases, the completeness of the sampling strategy, multiple process-of-care endpoints, and the longitudinal sampling that allowed analyses adjusted for secular trends. Another strength was the multi-modal intervention designed to optimize change in provider behavior that could be reflected at the institutional level. A drawback to the multi-modal approach is that we cannot discern which components were responsible for the changes observed. However, recent work in implementation science demonstrates that multi-modal approaches are needed to address complex health care systems and that any single method of implementation is inadequate to effectively change practice.

Some may see it as a limitation that the trial was not a randomized controlled trial. However, we chose a stepped wedge design, in which each site served as its own control and intervention effects could be examined in the context of longitudinal trends. This type of design is often considered more appropriate for implementation studies with large clusters.

As an implementation trial, the goal was to change provider practice patterns as reflected in institution-level changes in process. The trial was not designed to evaluate patient outcomes, which would require a different sampling and measurement approach. Thus, while we found evidence of improved patient care, we cannot form conclusions from these data about the impact of this care on patients or whether it enabled a more peaceful death.

In conclusion, this broadly targeted intervention strategy to change practice patterns led to modest but statistically significant changes in several processes of care, indicating its potential for widespread dissemination to improve end-of-life care for the thousands who die each year in inpatient settings. Further research may facilitate dissemination by identifying optimal implementation strategies.

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