Supplementary Online Content

Patel MI, Sundaram V, Desai M, et al. Effect of a lay health worker intervention on goals-of-care documentation and on health care use, costs, and satisfaction among patients with cancer: a randomized clinical trial. *JAMA Oncol.* Published online July 26, 2018. doi:10.1001/jamaoncol.2018.2446

eTable 1. Baseline Characteristics of the Study Participants[a]

Variable	Usual care (N=108)	Intervention (N=105)
Race – no (%)[b]		
Non-Hispanic White	83 (76)	82 (78)
Non-Hispanic Black	6 (6)	5 (5)
Asian Pacific Islander	2 (2)	5 (5)
Hispanic	2 (2)	2 (2)
American Indian/Native Alaskan	1 (1)	3 (2)
Other	5 (5)	4 (4)
Male sex – no (%)	108 (100)	103 (98)
Age--year	69.2 ± 9.20	69.4 ± 9.05
Distance from VA – miles	92.3 ± 258.54	92.9 ± 306.30
Marital Status		
Married	40 (37)	35 (33)
Unmarried	68 (63)	70 (67)
Anatomic Site of Cancer Diagnosis—no (%)		
Thoracic	39 (42)	41 (38)
Gastrointestinal	27 (23)	26 (25)
Genitourinary	9 (6)	8 (8)
Head and Neck	15 (18)	16 (15)
Skin	7 (5)	7 (5)
Other	11(3)	7 (7)
Cancer Stage at Diagnosis – no (%)		
1	3 (3)	4 (4)
2	17 (15)	12 (11)
3	29 (27)	30 (29)
4	59 (55)	59 (56)
Recurrent cancer – no (%)	33 (31)	29 (28)
Assessment of Satisfaction with Care[c]-- Score	8.73 ± 1.86	8.69 ± 1.90
Total Baseline HealthCare Costs--median (Interquartile Range)[d]	14,052 (4,613-35,684)	11,455 (3,567-29,085)

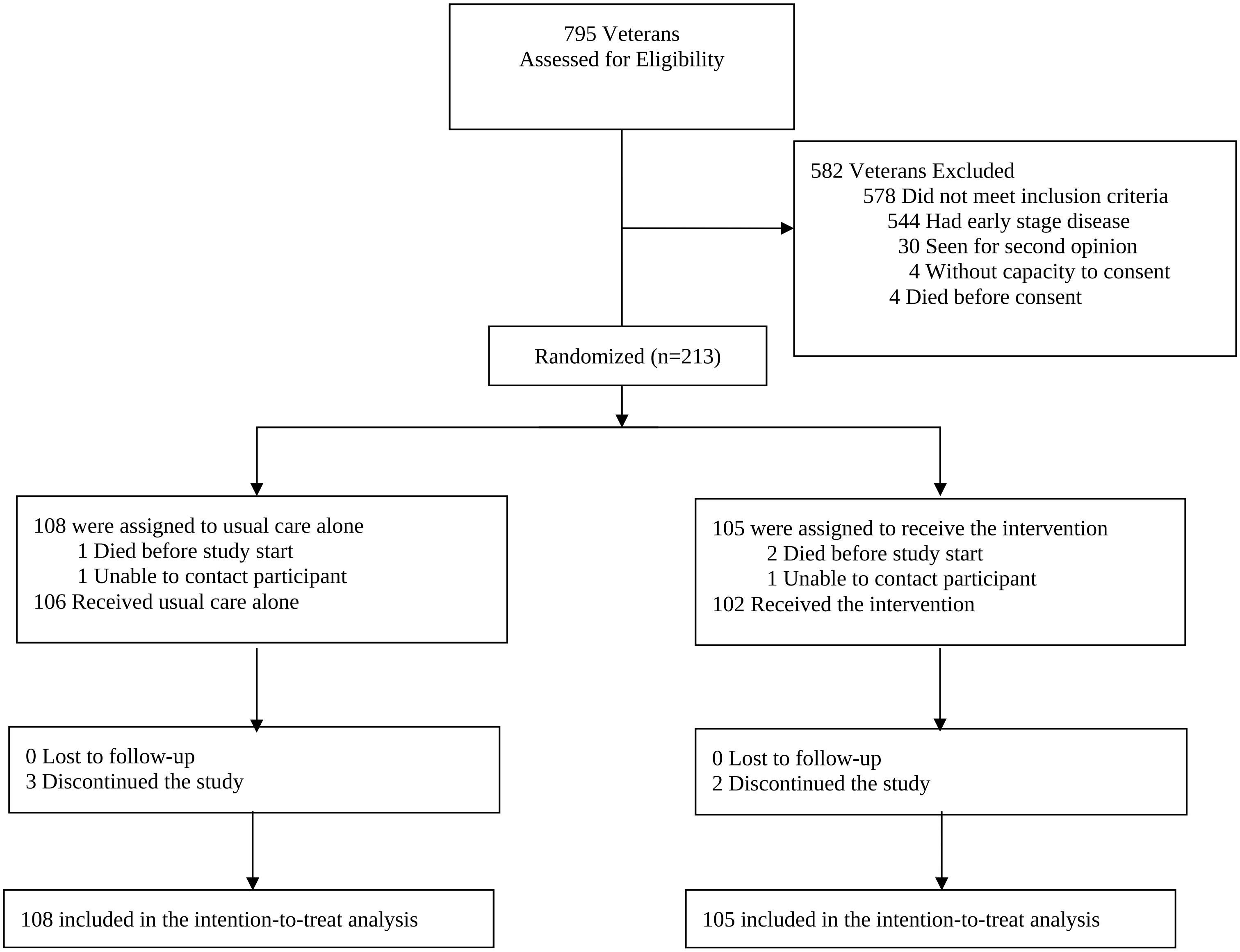
[a] Plus-minus values are means ± Standard Deviations. There were no significant differences between the usual care and intervention group for any of the variables listed ($p < 0.05$).

[b] Race and ethnic group were self-reported by patient.

[c] Scores for satisfaction with care were assessed using the Consumer Assessment of Healthcare Providers and Systems-General survey question #18 which measured rating of health provider, on which scores range from 0 to 10, with higher scores indicating higher ratings. Note: There were 7 patients who did not respond in the usual care group and 4 patients who did not respond in the intervention group.

[d] Total healthcare costs in US Dollars for 6 months prior to enrollment in the study. There were no differences in distribution of costs by study group (Wilcoxon Rank Sum p=0.33).

eFigure 1. Assessment for Eligibility, Randomization and Follow-up



eTable 2. Health Care Utilization and Total Costs of Care[a]

Variable	Usual care (N=108)	Intervention (N=105)	p value
Treatment- any within 6 months–no (%)			
Chemotherapy[b]	40 (37)	39 (37)	0.92
Radiation[c]	25 (23)	18 (17)	0.31
Surgery[c]	5 (5)	8 (8)	0.40
Palliative Care Received – no (%)			
6 months	15 (14)	20 (19)	0.29
15 months	20 (19)	28 (27)	0.14
Hospice Received – no (%)[b]			
6 months	20 (19)	37 (35)	0.006
15 months	30 (28)	47 (45)	0.009
Emergency Department Use			
Any ED use – no (%)[b]			
6 months	46 (43)	46 (44)	0.87
15 months	62 (57)	54 (51)	0.37
No. of Visits -- Mean ± SD[d]			
6 months	0.78 ± 1.15	0.74 ± 1.12	0.74
15 months	1.20 ± 1.53	1.03 ± 1.40	0.32
Hospitalization			
Any hospitalization– no (%)[b]			
6 months	40 (37)	49 (47)	0.15
15 months	55 (51)	53 (50)	0.94
No. of Admissions--Mean ± SD[d]			
6 months	0.56 ± 0.89	0.62 ± 0.80	0.71
15 months	0.88 ± 1.07	0.75 ± 0.94	0.54
Total Health Care Costs ($) – median (Interquartile Range)[e]			
6 months	52,112 (24,923-96,050)	55,476 (31,660-81,902)	0.21
15 months	111,958 (75,803-171,025)	86,025 (63,255-133,256)	0.08

[a] Plus-minus values are means ± Standard Deviations. All data reported for within 15 months post-randomization include data within 6-months post-randomization.

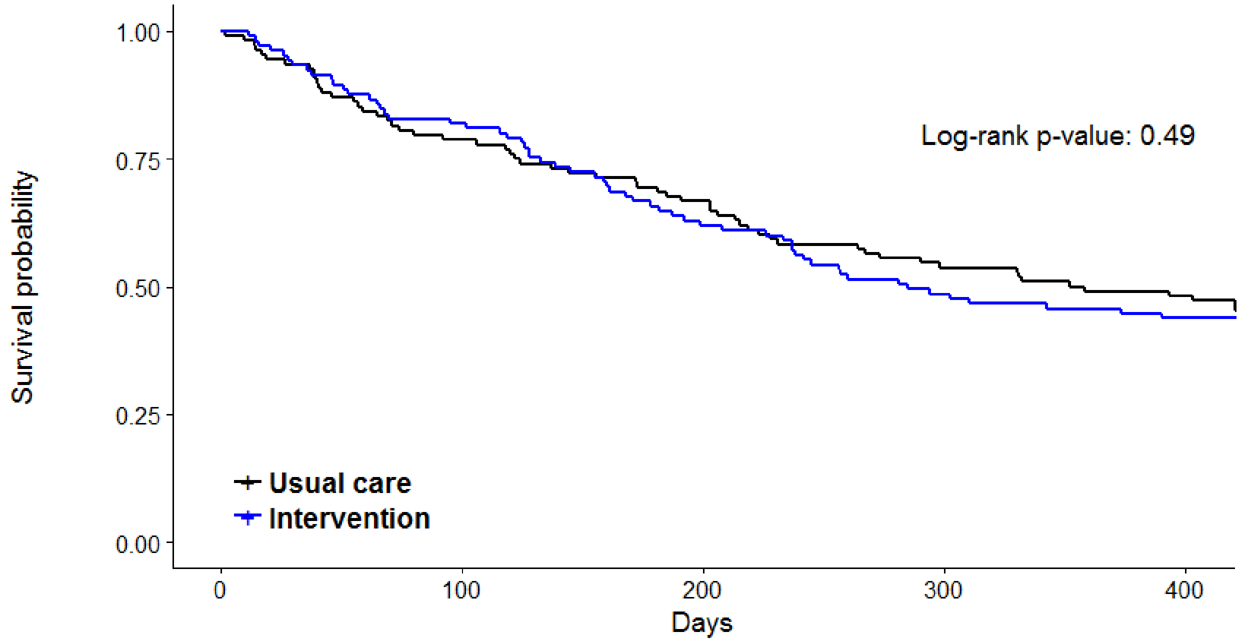
[b] The p value was estimated using logistic regression models adjusting for cancer site.

[c] The p value was estimated using chi-square test because the regression models did not converge.

[d] The p value was estimated using exact poisson regression models adjusted for cancer site.

[e] The p value was estimated using generalized linear model with gamma link-log with offset for follow-up time for costs and adjusted for cancer site. Total healthcare costs are in US Dollars.

eFigure 2. Survival Within 15 Months Post-Randomization by Group



Number at risk

	0	100	200	300	400
Usual care	108	85	72	58	52
Intervention	105	86	65	51	46

eTable 3. Characteristics of the Pilot Participants Who Died Within 15 Months[a]

Variable	**Group**		
	Usual care N=60	**Intervention N=60**	**p value[a]**
Race – no (%)			0.51
Non-Hispanic White	45 (75)	49 (82)	
Non-Hispanic Black	5 (8)	2 (3)	
Asian Pacific Islander	2 (3)	3 (5)	
Hispanic	1 (2)	2 (3)	
American Indian/Native Alaskan	1 (2)	3 (5)	
Other	2 (3)	0 (0)	
Did not provide	4 (7)	1 (2)	
Male sex – no (%)	60 (100)	59 (98)	1.00
Age--year	69.2 ± 9.20	69.4 ± 9.10	0.91
Anatomic Site Cancer Diagnosis—no (%)[d]			0.19
Thoracic	23 (38)	31 (58)	
Gastrointestinal	15 (25)	17 (28)	
Genitourinary	6 (10)	2 (3)	
Head and Neck	6 (10)	5 (8)	
Skin	2 (3)	1 (2)	
Other	8 (13)	4 (6)	
Cancer Stage at Diagnosis – no (%)[e]			0.70
1	3 (5)	2 (3)	
2	8 (13)	1 (2)	
3	12 (20)	17 (28)	
4	37 (62)	40 (67)	
Recurrent cancer – no (%)	18 (30)	12 (20)	0.21
Distance from VA – miles	67 ± 91	140 ± 404	0.17
Marital Status[b]			1.00
Married	18 (30)	18 (30)	
Unmarried	42 (70)	42 (70)	

[a] Plus-minus values are means ± Standard Deviations. All p values are adjusted for cancer site.

[b] Self-reported by patient.

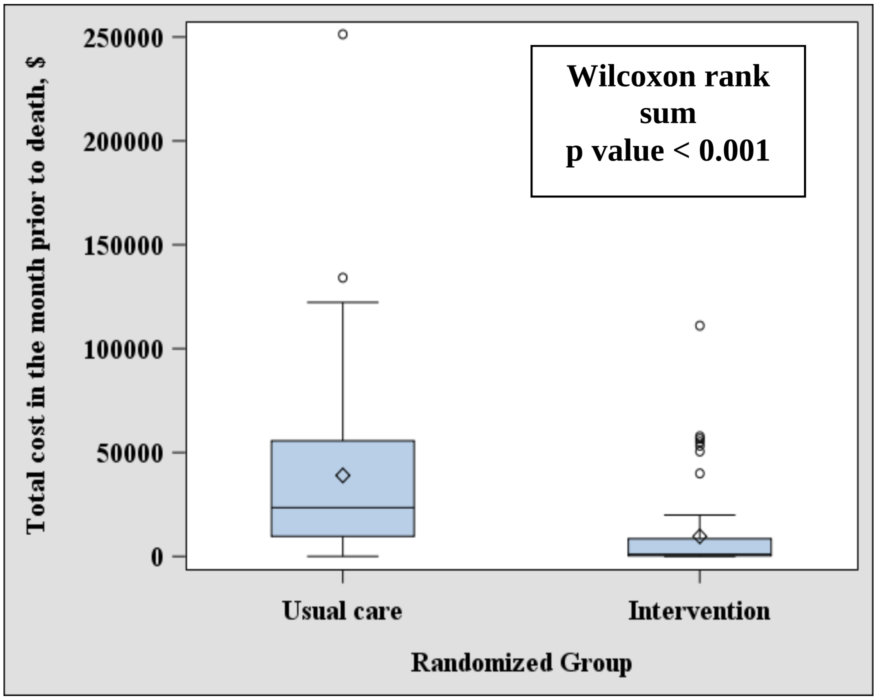
[c] The p value is for between-group comparison of the proportion who were non-Hispanic white and those who were members of a minority group, calculated with Fisher Exact Test

[d] The p value is for between-group comparison of the proportion who were diagnosed with thoracic cancer as compared to those who were diagnosed with other cancers, calculated with Fisher's exact test.

[e] The p value is for between-group comparison of the proportion who were diagnosed with Stage IV disease as compared to earlier stages (1-III) calculated with Fisher's Exact Test

Of note, in the Cox proportional hazard models, the hazard ratio for the intervention versus the usual care group was 1.11 (95% CI: 0.69-1.78, p=0.68).

eFigure 3. Distribution of Total Costs in the 30 Days Prior to Death Among Patients Who Died Within 15 Months of Study Enrollment



eAppendix

Lay Health Worker Program Cost and Interactions

Mean total healthcare expenditures for the intervention arm were $112,096 and $143,756 for the control arm (not reported in the manuscript). We estimate that the Lay Health Worker (LHW) Program reduced health care costs by approximately $31,660 on average for patients enrolled in the treatment arm resulting in approximately $3,324,300 in savings ($31,660 *105). The total costs associated with implementing the program were primarily in the form of training the LHW and the salary and benefits of the LHW and supervising nurse. The annual compensation costs of the LHW and the supervising nurse for Full Time Equivalent were $36,000 and $154,720, respectively. The LHW received one month of observational training while employed part-time for 20 hours weekly ($36,000/12*0.5=$1,500) and 80-hours of on-line training ($36,000*2/12=$6,000). The LHW and nurse supervisor provided services for 6 months for each patient. The LHW was employed part-time for 20 hours weekly ($36,000*6/12*.5=$9,000) and the nurse supervisor was compensated for 5% of Full Time Equivalent effort ($154,720*6/12*0.05=$3,868). The sum of these training and labor costs is $20,368. Thus, the net savings associated with the program were approximately $3,303,932, a 20% reduction in total healthcare spending, based on mean total healthcare expenditures (not reported in the manuscript).

All the patients assigned to the program, with the exception of four patients, two of whom died within one week of randomization, had at least one contact with the lay health worker within 6 months with the first contact occurring at mean (SD) of 21.9 (26.6) days from randomization. The mean (SD) number of contacts made with the lay health worker prior to documentation of patients' goals of care was 3.3 (2.4). The mean (SD) number of contacts the lay health worker made with the patient for the duration of the 6-month study was 12.7 (3.2).