Supplementary Online Content

Van Spall HGC, Lee SF, Xie F, et al. Effect of patient-centered transitional care services on clinical outcomes among patients hospitalized for heart failure: the PACT-HF pragmatic randomized clinical trial [published February 26, 2019]. *JAMA*. doi:10.1001/jama.2019.0710

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

eTable 1. Provincial databases used for baseline characteristics and outcomes

Database	Information Accessed
Registered Persons Database (RPDB)	Patients eligible to receive publicly-funded health care services
Canadian Institute for Health Information-Discharge Abstract Database (CIHI-DAD)	Acute care and rehabilitation discharges
National Ambulatory Care Reporting System (NACRS)	Emergency department and outpatient clinics
[a]Ontario Health Insurance Plan (OHIP)	Provider billings and laboratory services
Ontario Drug Benefit (ODB)	Drugs
Continuing Care Reporting System (CCRS)	Long-term and complex continuing care
[a]Management Information System (MIS)	Financial and statistical data for the entire hospital sector
[a]GAPP decision support systems (GAPP)	Physician payments
[a]Ontario Case Costing Initiative (OCCI)	Patient-specific case costing data
[a]Estimated Schedule of Benefits (ESTSOB)	Price associated with each OHIP fee code and suffix

[a]For secondary healthcare system cost outcomes, not reported in this publication

eTable 2. Baseline characteristics prior to propensity score[a] matching of intervention and usual care groups (N = 3022)

	Intervention (N=1104)	Usual Care (N=1918)	Standardized Difference
Demographics			
Age, mean (SD)	77.77 (12.42)	75.65 (13.62)	0.16
Sex Male, n(%)	560 (50.7)	963 (50.2)	0.01
Female, n(%)	544 (49.3)	955 (49.8)	
Resides in long-term care, n(%)	164 (14.9)	276(14.4)	0.01
Comorbidities			
Hypertension uncomplicated n(%)	787 (71.3)	1350 (70.4)	0.02
Atrial Fibrillation, n(%)	583 (52.8)	902 (47.0)	0.12
Diabetes with chronic complication, n(%)	524 (47.5)	904 (47.1)	0.01
Diabetes without chronic complication, n(%)	301 (27.3)	548 (28.6)	0.03
Chronic Kidney Disease, n(%)	242 (21.9)	398 (20.8)	0.03
Myocardial Infarction, n(%)	240 (21.7)	464 (24.2)	0.06
Chronic Pulmonary Disease, n(%)	235 (21.3)	438 (22.8)	0.04
Peripheral Vascular Disease, n(%)	107 (9.7)	185 (9.6)	0.00
Cerebrovascular Disease, n(%)	101 (9.1)	180 (9.4)	0.01
Dementia, n(%)	98 (8.9)	163 (8.5)	0.01
Gastrointestinal Bleeding, n(%)	79 (7.2)	128 (6.7)	0.02
Hypertension complicated	57 (5.2)	115 (6.0)	0.04
Mild Liver Disease, n(%)	32 (2.9)	53 (2.8)	0.01
Cancer (any), n(%)	19 (1.7)	24 (1.3)	0.04
Moderate or Severe Liver Disease	15 (1.4)	14 (0.7)	0.06
Resource utilization			
ED visits in prior 6 months, median (IQR)	2 (1-3)	2 (1-3)	0.08
Acute length of stay, median(IQR) days	6 (4-10)	5 (3-9)	0.19
Resource Intensity Weight[b], mean (SD)	1.45 (1.25)	1.56 (1.34)	0.08
Resource Intensity Weight[b], median (IQR)	1(1-2)	1(1-2)	0.15
Estimated risk			
LACE index[c], median (IQR)	12 (10-14)	11 (10-13)	0.13
Charlson comorbidity index[d], mean (SD)	2.43 (1.27)	2.36 (1.33)	0.05

[a]Prior to application of the propensity score, the intervention group was significantly older and had a higher prevalence of atrial fibrillation, longer length of stay, greater resource intensity weight, and higher LACE score than the usual care group (n=1918). These differences were not statistically significant after application of the propensity score, which was derived using age, sex, admission through the ED, length of stay >2 days, and presence of diabetes, chronic kidney disease, myocardial infarction, or atrial fibrillation.

Other than self-reported QOL, all data was obtained from administrative databases. Baseline comorbidities were obtained using a 5-year retrospective review of databases.

[b] Resource Intensity Weights (RIW)[32] provide an estimate of the cost of resources used in the care of a patient relative to the average hospitalized patient. The higher the RIW, the higher the resource utilization relative to the average inpatient.

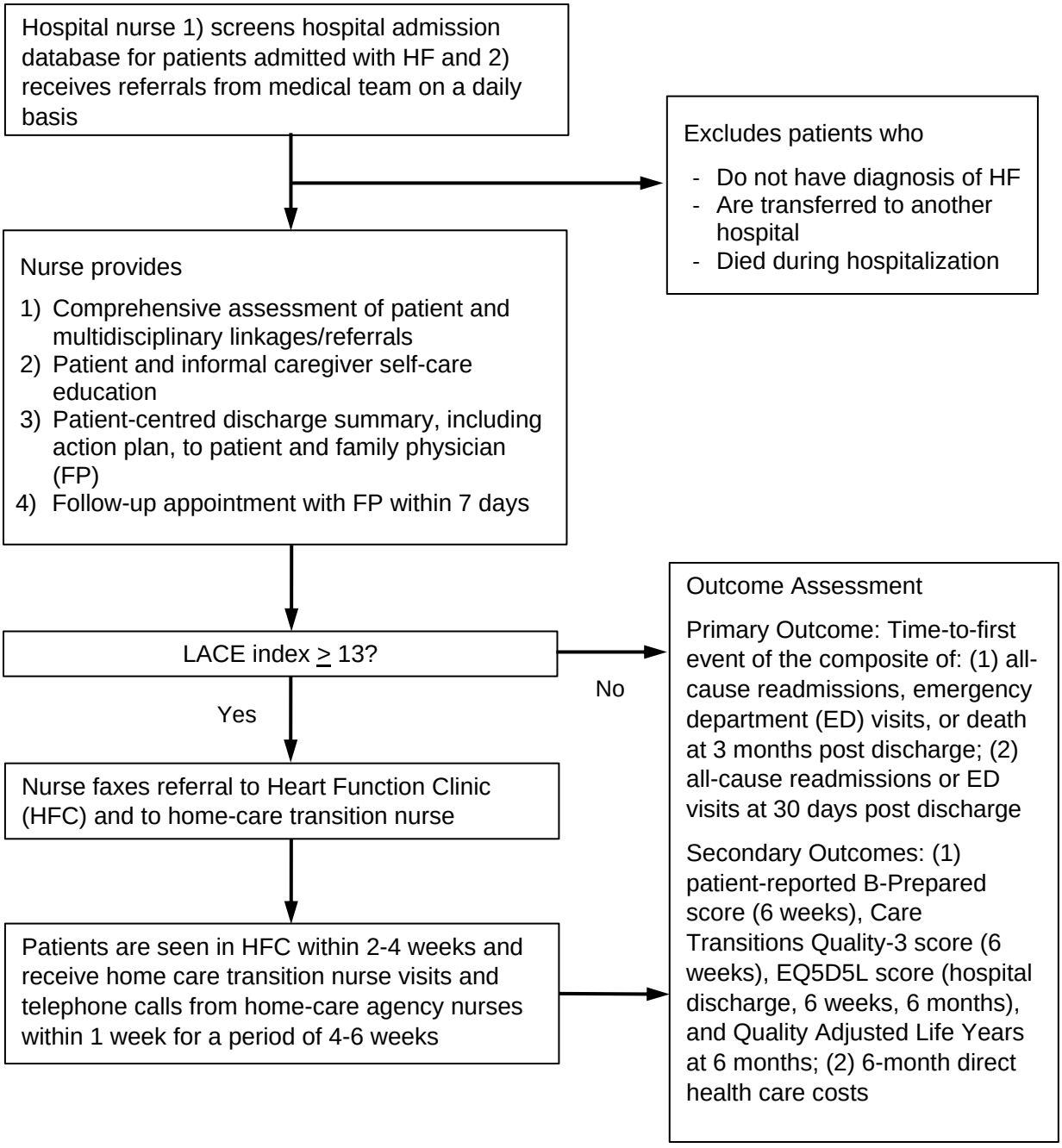
[c]LACE[22,23] index is derived from Length of Stay, Acuity of presentation, Comorbidities, and ED visits in preceding 6 months. It ranges from 1 to 19, with higher scores associated with a higher risk of readmission or death following hospitalization.

[d]Charlson comorbidity index[31] is a method of predicting mortality and assessing disease burden based on comorbidities. The severity of comorbidity is categorized into three grades: mild (scores of 1–2); moderate (scores of 3–4); and severe (scores ≥5).

eTable 3. Post-hoc clinical outcomes: number of readmissions and ED visits among patients alive at 30 days and 3 months

	[a]Intervention (N=1104)			[b]Usual Care (N=1390)			Relative Risk (95% CI)	P-value
	n events	Mean (SD)[a] events / patient	n (%) patients with event(s)	n events	Mean (SD)[a] events / patient	n (%) patients with event(s)		
3 month all-cause readmissions or ED visits	797	0.80 (1.55)	434 (43.7%)	992	0.79 (1.15)	562 (44.8%)	1.03 (0.86, 1.25)	0.73
3 month all-cause readmissions	434	0.44 (0.78)	308 (31.0%)	566	0.45 (0.79)	394 (31.4%)	1.09 (0.86, 1.37)	0.49
3 month all-cause ED visits	363	0.37 (1.19)	220 (22.2%)	426	0.34 (0.73)	300 (23.9%)	0.97 (0.79, 1.19)	0.77
3 month HF readmissions[c]	163	0.16 (0.46)	132 (13.3%)	223	0.18 (0.47)	183 (14.6%)	1.10 (0.83, 1.46)	0.50
30 day all-cause readmissions or ED visits	352	0.33 (0.69)	271 (25.5%)	492	0.36 (0.65)	381 (28.2%)	1.00 (0.82, 1.21)	0.98
30 day all-cause readmissions	215	0.20 (0.45)	193 (18.1%)	279	0.21 (0.47)	243 (18.0%)	1.14 (0.89, 1.46)	0.31
30 day all-cause ED visits	137	0.13 (0.46)	107 (10.1%)	213	0.16 (0.43)	182 (13.5%)	0.83 (0.58, 1.18)	0.30
30 day HF readmissions[d]	83	0.08 (0.29)	76 (7.1%)	110	0.08 (0.29)	103 (7.6%)	1.07 (0.71, 1.60)	0.76

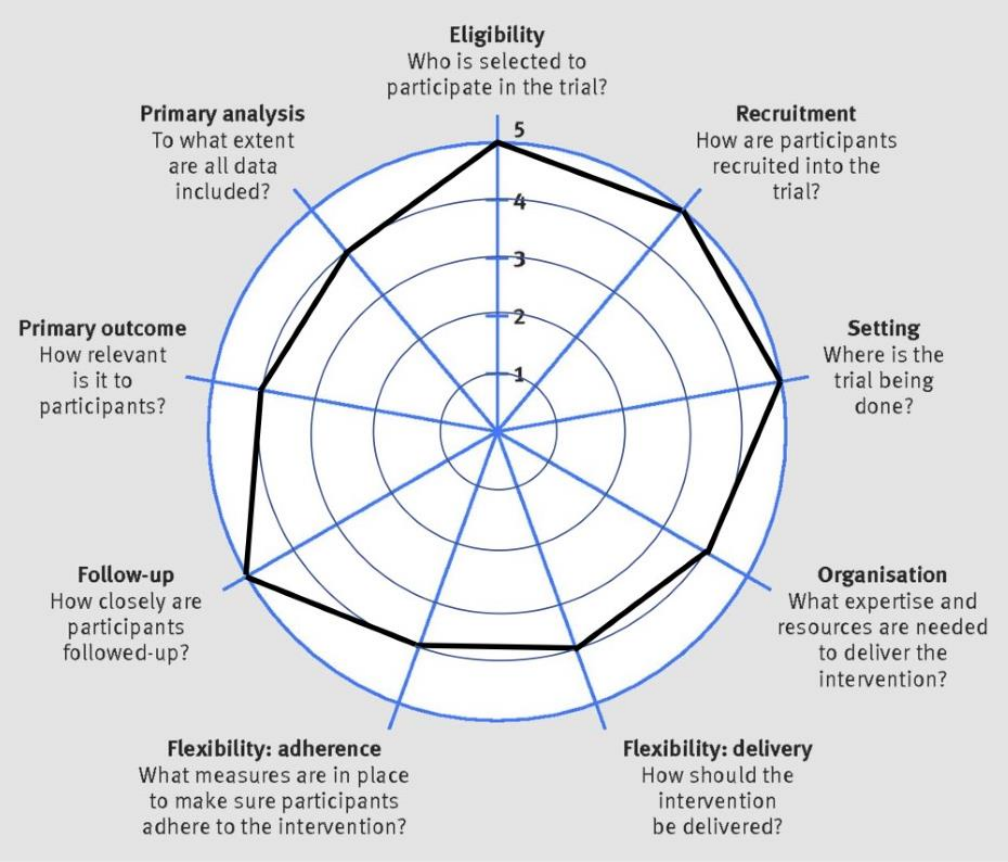
[a]Among the 1104 intervention patients, 1065 were alive at 30 days and 993 were alive at 3 months.
[b] Among the 1390 usual care patients, 1350 were alive at 30 days and 1254 were alive at 30 days.
[c]Mean (SD) for all the eligible patients excluding patients who died before the event occurred.
[d]Readmission for most responsible diagnosis of HF.



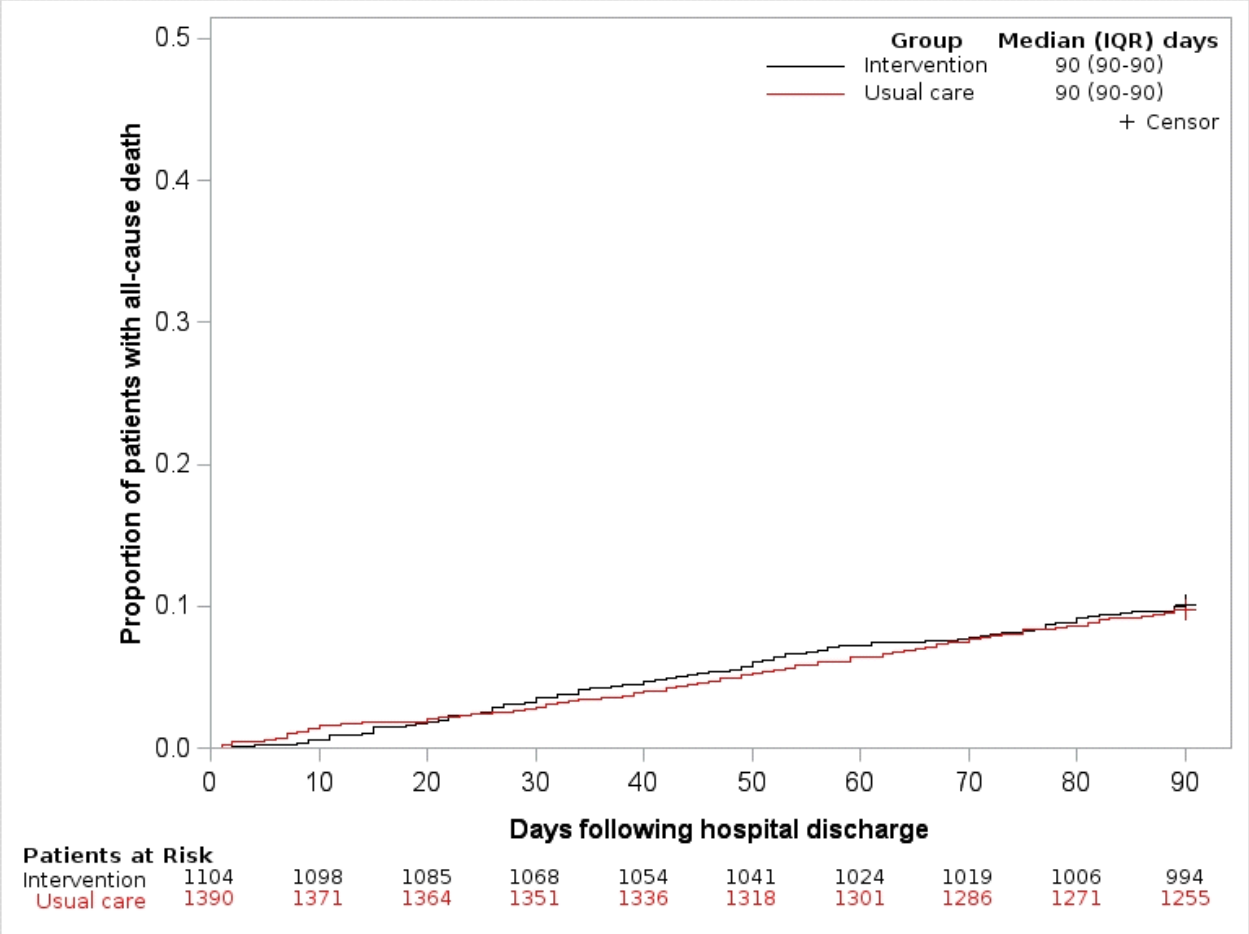
eFigure 1. Study protocol and outcome measures. A diagnosis of HF was excluded if NT-proBNP < 300 pg/mL, BNP< 50 pg/mL, or Boston criteria (scoring system based on history, physical exam, and chest radiography findings) < 5.

Site	Step (Month)										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1	0	1	1	1	1	1	1	1	1	1	1
2	0	0	1	1	1	1	1	1	1	1	1
3	0	0	0	1	1	1	1	1	1	1	1
4	0	0	0	0	1	1	1	1	1	1	1
5	0	0	0	0	0	1	1	1	1	1	1
6	0	0	0	0	0	0	1	1	1	1	1
7	0	0	0	0	0	0	0	1	1	1	1
8	0	0	0	0	0	0	0	0	1	1	1
9	0	0	0	0	0	0	0	0	0	1	1
10	0	0	0	0	0	0	0	0	0	0	1

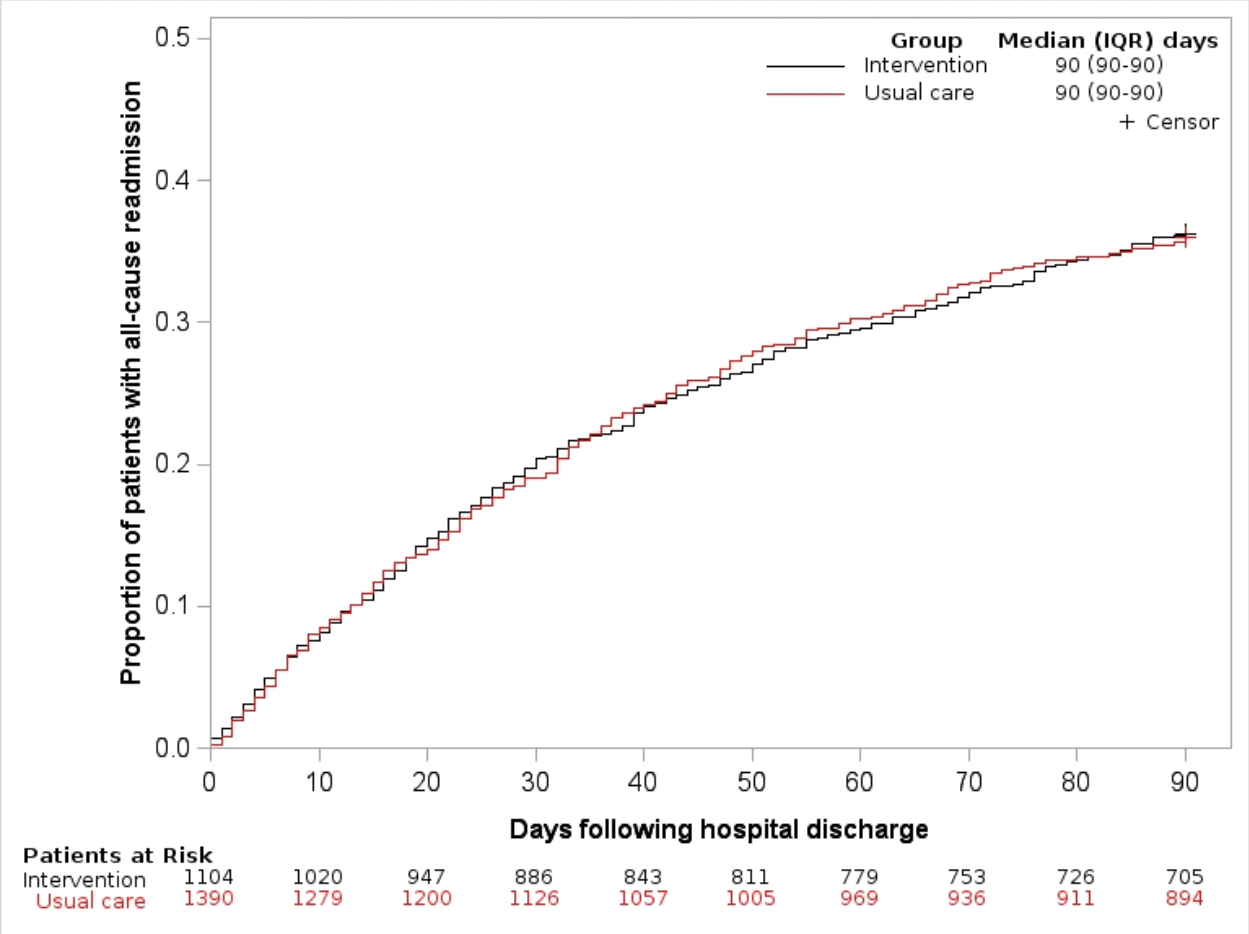
eFigure 2. Study design of the Patient-Centered Care Transitions in HF trial. "0" represents sites receiving usual care and "1" represents sites receiving the intervention. Hospitals cross over from usual care to intervention in a randomized sequence. Outcomes are measured at participating hospitals the month prior to the intervention phase and whenever a new hospital ("step") receives the intervention. At each step, outcomes are measured at all hospital sites and there is a comparison of outcomes between the hospitals receiving the intervention (intervention wedge) and hospitals not to receiving it (control wedge); thus comparisons are made both within and between clusters at each step. There are 10 hospital sites, 11 steps, 55 usual care cross-sections, and 55 intervention cross-sections. There is a one-month interval between steps. The clear cells represent the usual care wedge and the shaded cells represent the intervention wedge. The cells within bolded borders sites depict hospitals collecting the patient-centered outcomes. There are 11*10 = 110 measurements for the clinical and cost outcomes and 9*8 = 72 measurements for the patient-centered outcomes.



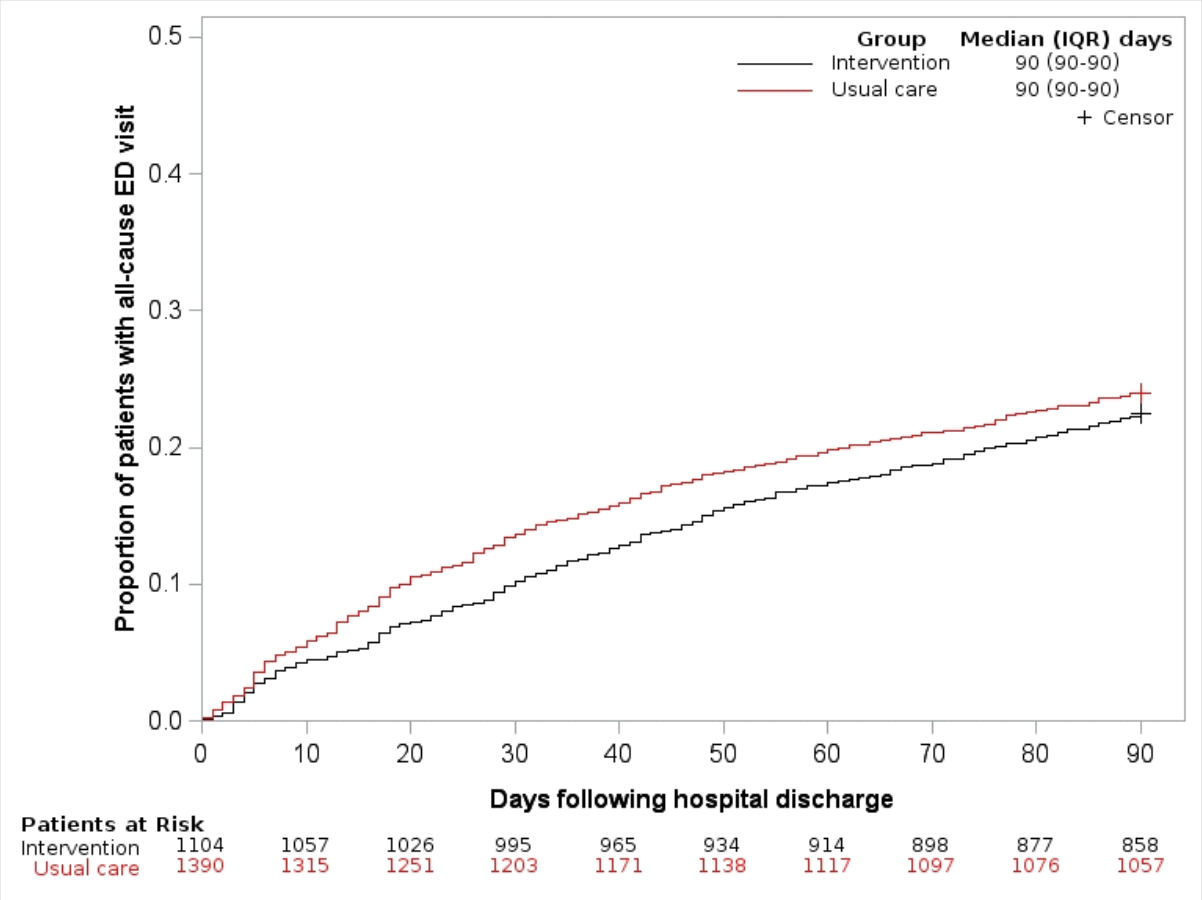
eFigure 3. Pragmatic study design choices of the Patient-Centered Care Transitions in HF trial. The 9 domains of trial design are scored from 1 (very explanatory, designed to demonstrate efficacy in “ideal conditions”) to 5 (very pragmatic, designed to assess effectiveness in “usual conditions”). The black lines represent design scores of the PACT-HF trial, demonstrating that the trial design is closer to pragmatic than explanatory. Scoring tool for domain choices are obtained from BMJ 2015;350:h2147



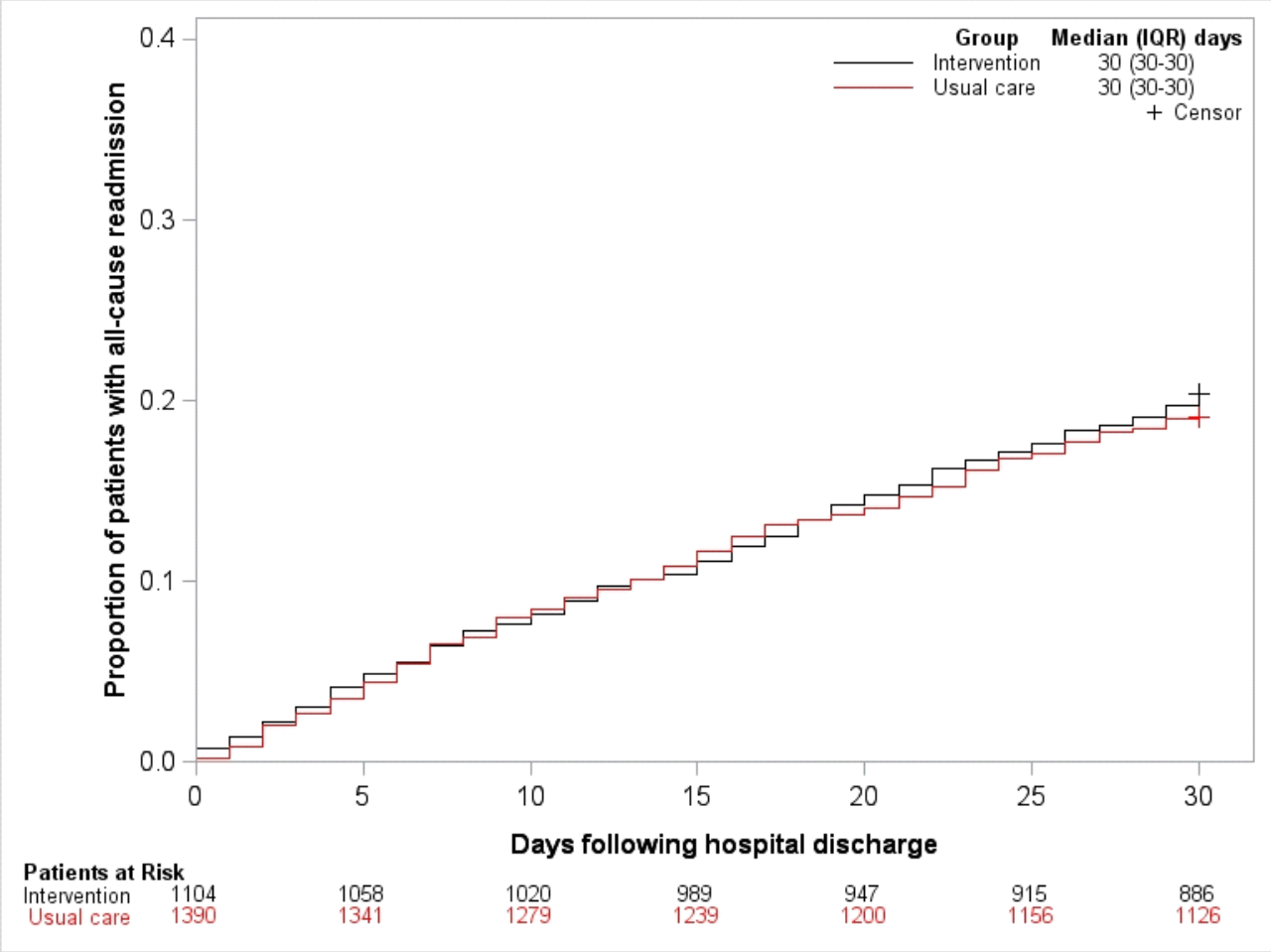
eFigure 4a. Kaplan-Meier curves for the post-hoc outcomes of time-to-first all-cause death at 3 months in the intervention and usual care groups. Outcomes are measured relative to the date of hospital discharge following index hospitalization for HF, with patients analyzed in their allocated treatment group.



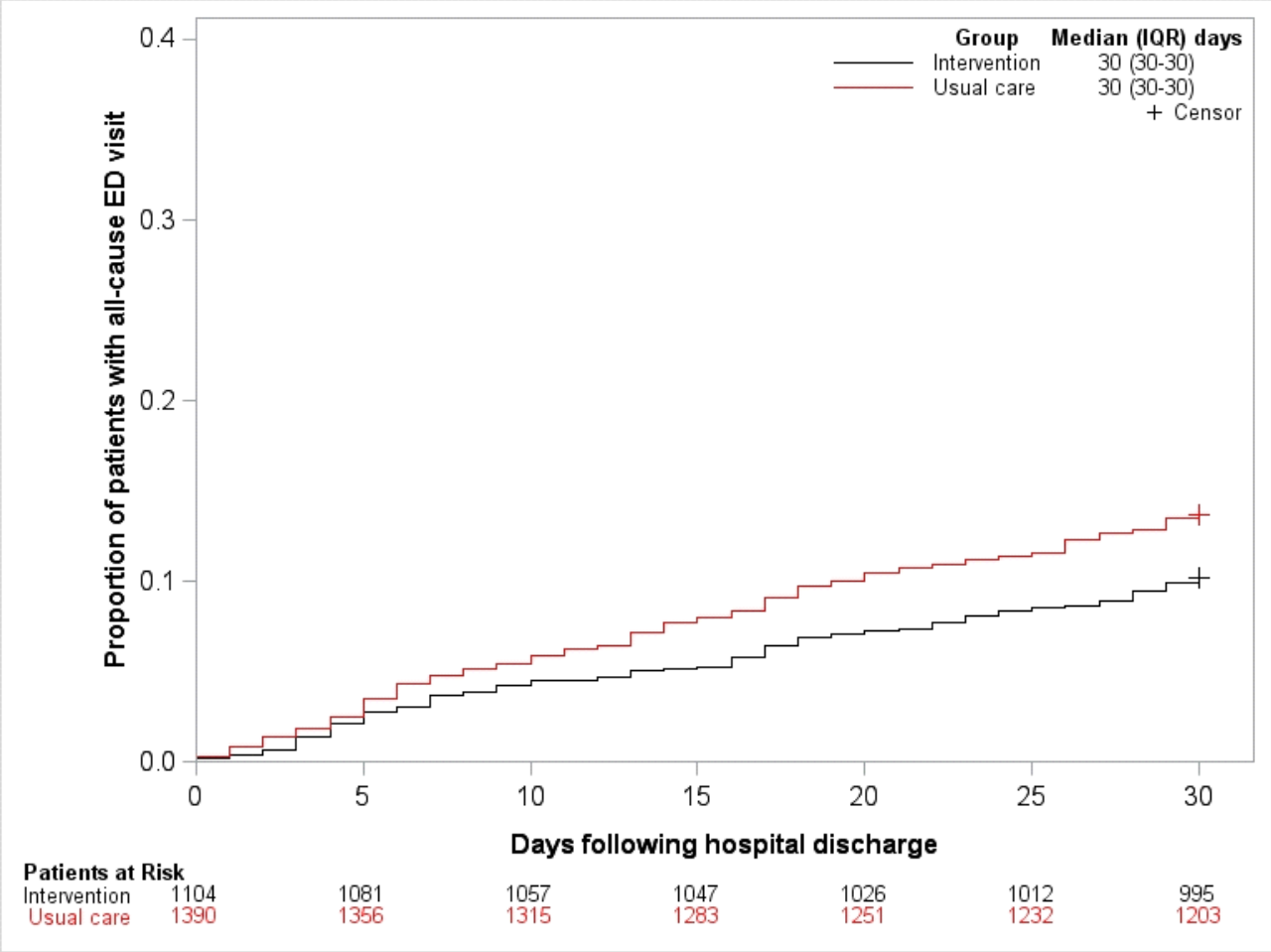
eFigure 4b. Kaplan-Meier curves for the post-hoc outcomes of time-to-first all-cause readmission at 3 months in the intervention and usual care groups. Outcomes are measured relative to the date of hospital discharge following index hospitalization for HF, with patients analyzed in their allocated treatment group.



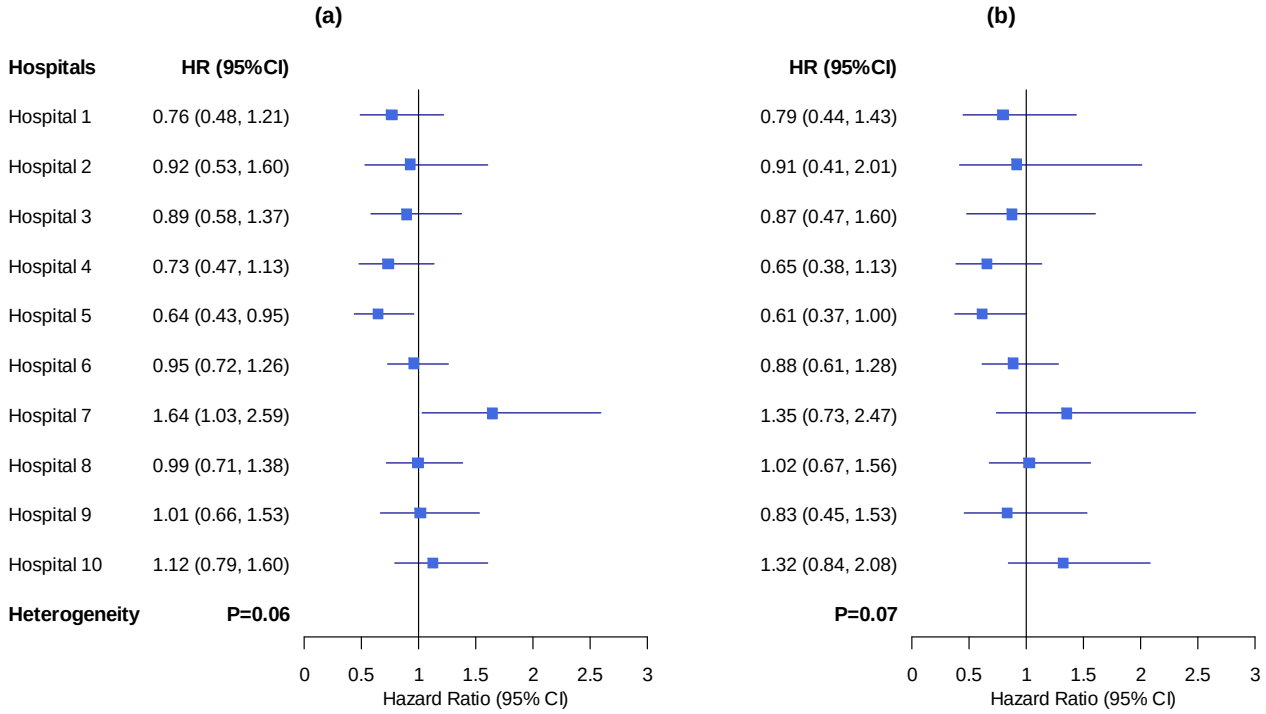
eFigure 4c. Kaplan-Meier curves for the post-hoc outcomes of time-to-first all-cause ED visit at 3 months in the intervention and usual care groups. Outcomes are measured relative to the date of hospital discharge following index hospitalization for HF, with patients analyzed in their allocated treatment group.



eFigure 5a. Kaplan-Meier curves for the post-hoc outcomes of time-to-first all-cause readmission at 30 days in the intervention and usual care groups.
Outcomes are measured relative to the date of hospital discharge following index hospitalization for HF, with patients analyzed in their allocated treatment group.



eFigure 5b. Kaplan-Meier curves for the post-hoc outcomes of time-to-first all-cause ED visit at 30 days in the intervention and usual care groups. Outcomes are measured relative to the date of hospital discharge following index hospitalization for HF, with patients analyzed in their allocated treatment group.



eFigure 6. Before-after hospital level subgroup analysis of the primary composite outcome of (a) time-to-first composite readmission, ED visit, or death at 3 months and (b) time-to-first composite readmission or ED visit at 30 days. Hospitals are ordered from 1 to 10 according to the sequence of crossover from usual care to intervention. There was no statistically significant heterogeneity observed between hospitals in the effect of the intervention on the primary composite outcomes at 3 months (P=0.06) and 30 days (P=0.07).