

Supplementary material

Figure 1: This table presents the variables used in the plasmode simulation, along with their beta values for treatment outcome and allocation.

Resampled Covariates	Covariates description	Variable Type (Hospital level/Patient level)	Beta value to treatment allocation	Beta value to treatment outcome
Hospital location: urban/rural	Binary indicator	Hospital level	Varied depends on simulated scenarios	Varied depends on simulated scenarios
Hospital yearly surgery volume	Continuous covariates	Hospital level	Varied depends on simulated scenarios	Varied depends on simulated scenarios
Hospital size: beds 500+ / 500<	Binary indicator on number of beds	Hospital level	Varied depends on simulated scenarios	Varied depends on simulated scenarios
Hospital region: Midwest Northeast South West	Binary indicator for each region	Hospital level	Varied depends on simulated scenarios	Varied depends on simulated scenarios
Gender: Male	Binary indicator	Patient-level	0.0059	0.0446

Charlson comorbidity index:	Binary indicator	Patient-level	= [-0.5377,	= [0,
cci01_mi (Myocardial infarction)	(please refer to ICD website for definition)(32)		0.1663,	0,
cci02_chf (Congestive heart failure)			0.2085,	0,
cci03_pvd (Peripheral vascular disease)			-0.3956,	0,
cci04_cvd (Cerebrovascular disease, e.g. stroke, TIA)			0.3931,	0.6257,
cci05_dem (Dementia)			0.4199,	-0.3543,
cci06_cpd (Chronic pulmonary disease)			-0.9809,	0.3292,
cci07_ra (Rheumatologic disease, e.g. rheumatoid arthritis, SLE)			0.4428,	1.3924,
cci08_ulcer (Peptic ulcer disease)			0.4518,	-0.7073,
cci09_liv (Mild liver disease)			0.1991,	0.0427,
cci10_diab (Diabetes, uncomplicated)			-0.1402,	0.2751,
cci11_diabc (Diabetes, with chronic complications)			0.2915,	-1.1135,
cci12_para (Hemiplegia or paraplegia)			-0.0850,	0.1841,
cci13_renal (Moderate/severe renal disease)			0.2536,	-0.2704,
cci14_can (Any malignancy, excluding metastatic)			-1.1945,	0.4792,
cci15_livc (Moderate/severe liver disease)			-0.7572,	1.0809,
cci16_can2 (Metastatic solid tumor)			-0.9668]	1.7748]
cci17_hi (HIV/AIDS)				
elx01_chf (Congestive heart failure)	Binary indicator	Patient-level	= [0.0001,	= [0.0001,

elx02_arrhy (Cardiac arrhythmias)	(please refer to ICD website for definition)(32)	0.4229,	-0.8228,
elx03_valv (Valvular disease)		0.5468,	-0.5327,
elx04_pcd (Pulmonary circulation disorders)		0.2540,	-0.6094,
elx05_pvd (Peripheral vascular disease)		0.0001,	0.0001,
elx06_htn (Hypertension, uncomplicated)		0.4633,	-0.6840
elx07_htnc (Hypertension, complicated)		0.6315,	-0.5349,
elx08_para (Paralysis)		0.0001,	0.0001,
elx09_neur (Other neurological disorders)		0.0798,	-0.7336,
elx10_cpd (Chronic pulmonary disease)		0.0001,	0.0001,
elx11_diab (Diabetes, uncomplicated)		0.0001,	0.0001,
elx12_diabc (Diabetes, with chronic complications)		-0.1023,	-0.7064,
elx13_thyr (Hypothyroidism)		0.2328,	-0.5250,
elx14_renal (Renal failure)		0.4569,	-0.6761,
elx15_liv (Liver disease)		0.0001,	0.0001,
elx16_ulcer (Peptic ulcer disease, excluding bleeding)		-0.0923,	0.1349,
elx17_hiv (HIV/AIDS)		-0.2404,	-2.0708,
elx18_lym (Lymphoma)		0.0001,	0.0001,
elx19_can2 (Metastatic cancer)		0.7531,	-0.7385,
elx20_can (Solid tumor without metastasis)		0.0001,	0.0001,
elx21_ra (Rheumatoid arthritis / collagen vascular diseases)		2.8454,	0.1372,
elx22_coag (Coagulopathy)		1.1696,	-0.8852,

elx23_obe (Obesity) elx24_wtl (Weight loss) elx25_fed (Fluid and electrolyte disorders) elx26_bla (Blood loss anemia) elx27_dfa (Deficiency anemias) elx28_alc (Alcohol abuse) elx29_dabu (Drug abuse) elx30_psy (Psychoses) elx31_depr (Depression)			0.8657, 0.7900]	-0.9450, -0.6802]
Cumulative Charlson comorbidity	Continuous covariates: sum of the binary charlson index	Patient-level	=0.2064	=0.2887
Cumulative Elixhauser Comorbidity	Continuous covariates: sum of the binary Elixhauser Comorbidity	Patient-level	=-0.5529	=-0.7735
Cancer type: cancer_c250pancreatic cancer_c251pancreatic cancer_c252pancreatic cancer_c253pancreatic cancer_c254pancreatic cancer_c257pancreatic cancer_c258pancreatic cancer_c259pancreatic	Binary indicator of cancer tumour type. (Please refer to Nation cancer institute for definition of the index)(32)	Patient-level	= [1.4075, -4.0277, -5.0587, -0.7763, -2.9712, -1.9126, -1.8827, 0]	= [0.0626, 0.2530, 0.1875, -0.0399, 0.43575, 0.1009, 0.2340, -0.0589]
Race: Black	Binary indicator	Patient-level	= [0,0,0,0]	= [0.0531, 0.1124, 0.2005,

White				0]
Native Hawaiian/pacific Islander				
Others				
Attending physician specialty:	Binary indicator	Patient-level	=[0.0001, -0.0217, 0.4560, -0.6445]	=[0.0001, 0.2154, -0.1095, -0.0453]
General				
Surgical Oncology				
Transplant Surgery				
Other				
Length of stays (days)	Continuous covariate	Patient-level	=0.0251	=0.1413

Figure 2: Summary of the various scenarios generated by the plasmode simulation.

Simulated scenario	Resampled Variables	Beta value to treatment allocation	Beta value to treatment outcome
Fixed hospital effect on treatment allocation but varying on treatment allocation	Hospital location: urban/rural	Negligible: = 0.002 Low: = 0.2338 Medium: = 0.4675 High: = 0.9350	Fixed: = -0.8570
	Hospital yearly surgery volume	Negligible: = 0 Low: = 0.0008 Medium: = 0.0016 High: = 0.0024	Fixed: = 0.0059
	Hospital size: beds 500+/ 500>	Negligible: = 0.0009 Low: = 0.0889 Medium: = 0.1778 High: = 0.3556	Fixed: = 0.3442
	Hospital region:	Negligible: = [0.0057, 0.0021, 0.0022,0]	Fixed: = [0.0990, 0.3626, 0.2016, 0.0001]

	Midwest		
	Northeast	Low: = [0.5710, 0.2145, 0.2167,0]	
	South		
	West	Medium: = [1.1419, 0.4290, 0.4333,0.0001]	
		High: = [2.2838, 0.8580, 0.8666,0]	