Supplemental tables and figures:

Supplemental table 1. Facility and individual trial eligibility criteria

	HD Trial	METRIcaL
Facility eligibility criteria	- Within 50 miles of a CDC reporting city >50 long stay residents on October 1st, 2013 $\geq$ 80% of residents 65 years or older on October 1st, 2013	- One of four facility chains - No previous use of the music and memory program - No recent situations that might affect implementation of the intervention (e.g., bad state or federal quality assurance surveys, leadership turnover, or other competing demands) $\geq$ 20 eligible residents
Individual eligibility criteria ("candidate" for treatment)	65 Years or older - Long stay resident - No contraindications for HD vaccine	- Diagnosis of Alzheimer's disease or dementia - Long stay resident - Not hard of hearing - Cognitive functioning score of 3 or 4 (scale 0 to 6)

CDC = Centers for Disease Control and Prevention

Supplemental table 2. ICD-9 and ICD-10 codes used to identify covariates in the MDS		
Condition	ICD-9	ICD-10
Alzheimer's disease	331.0, 331.11, 331.19, 331.2, 331.82,331.7, 290.0, 290.10, 290.11, 290.12, 290.13, 290.20, 290.21, 290.3, 290.40, 290.41, 290.42, 290.43, 294.10, 294.11, 294.20, 294.21, 797	G30.9 , G31.01 , G31.09 , G31.1 , G31.83 , G94. , F03.90 , F05, F01.50 , F01.51 , F02.80 , F02.81 , F03.90 , F03.91 , R41.81
Diabetes	250.x	E08.x, E09.x, E10.x, E11.x, E12.x
Pneumonia	480, 481, 482, 485, 486, 487, 488	J13.x, J14.x, J15.x, J16.x, J17.x, J18.x
Congestive heart failure	414.x	I50.2, I50.3
Hypertension	401.x	I10.x
Cirrhosis	571.x	K74.x
Renal failure	574.x	N18.x
Atrial fibrillation	148.0, 148.1, 148.2, 148.3, 148.4, 148.91, 148.92	148.0, 148.1, 148.2, 148.3, 148.4, 148.91, 148.92
Coronary Artery Disease	429.2	I25.x

MDS = Minimum Data Set

Supplementary table 3. Fully adjusted association between facility characteristics and participation status in the HD trial. Estimates were obtained from a multinomial model and reflect the log odds of the designated status relative to being a randomized facility.

	Eligible non-randomized facilities			Ineligible facilities	
	Log-odds	P-value		Log-odds	P-value
Intercept	-5.36	0.0000		10.16	0.0000
Facility measures					
Total beds	0.00	0.0000		-0.02	0.0000
Resource poor	-0.33	0.1221		0.21	0.2750
For profit	-0.97	0.0000		-1.31	0.0000
Chain facility	-1.30	0.0000		-1.25	0.0000
Alzheimer's/Dementia Unit	-0.39	0.2149		-0.34	0.2547
Any special unit	0.37	0.2252		0.18	0.5361
RN to nurse ratio	-1.27	0.0000		-0.81	0.0010
Direct Care hours/PPD	-1.39	0.0000		1.30	0.0000
RN hours/PPD	0.37	0.0087		-2.34	0.0000
LPN hours/PPD	0.75	0.0000		-1.88	0.0000
CNA hours/PPD	1.99	0.0000		-0.47	0.0000
Acuity index	0.15	0.0001		-0.01	0.7391
Occupancy rate	0.00	0.3093		-0.04	0.0000
2012 mortality rate	-0.01	0.2395		-0.02	0.0094
2012 all-cause hospitalization rate	0.01	0.0466		0.02	0.0071
2012 ILI hospitalization rate	0.01	0.4602		0.03	0.0425
2012 Influenza vaccination rate	0.01	0.0094		0.00	0.6183
Individual measures aggregated to the facility level: candidates for the intervention					
Diabetes	-0.65	0.0569		-0.94	0.0034
Alzheimer's/Dementia	0.05	0.9009		-1.53	0.0000
Chronic kidney disease	0.87	0.0008		0.58	0.0285

Indwelling catheter	-2.56	0.0000		-1.82	0.0000
Ventilator	-3.82	0.0000		5.04	0.0000
Hypertension	-0.40	0.2339		-1.51	0.0000
Cirrhosis	-5.35	0.0000		-8.53	0.0000
Pneumonia	1.78	0.0000		0.13	0.6383
Congestive heart failure	0.73	0.0513		1.56	0.0000
Candidate for intervention	-5.36	0.0000		10.16	0.0000
Atrial fibrillation	-0.83	0.0002		-0.65	0.0068
Coronary artery disease	-0.66	0.0250		-0.54	0.0605
Chemotherapy	0.29	0.0000		-3.87	0.0000
Radiation	-0.96	0.0000		-1.05	0.0000
Dialysis	-3.03	0.0000		-3.24	0.0000
Age	0.01	0.4107		-0.08	0.0000
Standard deviation of age	-0.07	0.1074		-0.21	0.0000
Individual measures aggregated to the facility level: non-candidates for the intervention					
Diabetes	0.73	0.0173		-0.14	0.6365
Alzheimer's/Dementia	0.79	0.0341		0.56	0.1153
Chronic kidney disease	-0.92	0.0003		-0.59	0.0180
Indwelling catheter	-1.23	0.0000		-2.22	0.0000
Ventilator	0.78	0.0000		4.93	0.0000
Hypertension	0.47	0.1423		0.95	0.0019
Cirrhosis	-3.36	0.0000		-7.45	0.0000
Pneumonia	1.25	0.0000		0.88	0.0000
Congestive heart failure	0.11	0.7022		0.29	0.3042
Atrial fibrillation	-0.74	0.0002		-0.77	0.0001
Coronary artery disease	-0.58	0.0177		-0.73	0.0027
Chemotherapy	-3.35	0.0000		-5.40	0.0000
Radiation	-6.79	0.0000		-4.82	0.0000
Dialysis	1.42	0.0000		-0.64	0.0809
Age	0.12	0.0000		0.00	0.8966

Standard deviation of age	0.09	0.0000		-0.03	0.1206

PPD = Per patient day; RN = registered nurse; LPN = licensed practical nurse; CNA = certified nursing assistant; ILI = influenza like illness

Supplementary table 4. Fully adjusted association between facility characteristics and participation status in the METRICaL trial. Estimates were obtained from a multinomial model and reflect the log odds of the designated status relative to being a randomized facility.

	Eligible non-randomized facilities			Ineligible facilities	
	Log-odds	**P-value**		**Log-odds**	**P-value**
Intercept	1.33	0.6029		6.86	0.0092
Facility measures					
Total beds	0.01	0.0867		-0.02	0.0042
Resource poor	0.96	0.1472		-0.40	0.6307
For profit	-3.16	0.0246		-5.35	0.0010
Chain facility	-1.74	0.0734		0.83	0.4275
Alzheimer's/Dementia Unit	-0.29	0.8353		-2.13	0.1606
Any special unit	0.53	0.6785		0.07	0.9604
RN to nurse ratio	-0.74	0.7857		-0.43	0.8873
Direct Care hours/PPD	-1.98	0.0000		1.30	0.0001
RN hours/PPD	1.51	0.1397		-1.31	0.2551
LPN hours/PPD	0.98	0.3970		-1.10	0.3730
CNA hours/PPD	2.19	0.0000		-0.88	0.0654
Acuity index	0.04	0.8903		-0.22	0.4204
Occupancy rate	0.03	0.1804		0.04	0.0370
Chain					
Chain A	0.00	--		0.00	--
Chain B	2.95	0.0463		3.23	0.0534
Chain C	-0.56	0.7554		-0.27	0.8956
Chain D	1.83	0.2431		1.89	0.2787
Individual measures aggregated to the facility level: candidates for the intervention					
Diabetes	2.31	0.2838		1.11	0.5927
Alzheimer's/Dementia	1.33	0.6029		6.86	0.0092
Chronic kidney disease	9.20	0.0184		8.76	0.0254
Indwelling catheter	2.02	0.6193		6.05	0.1470

Ventilator	10.07	0.0000		20.91	0.0000
Hypertension	0.09	0.9652		-1.57	0.4028
Cirrhosis	16.86	0.0000		-6.38	0.0000
Pneumonia	-4.11	0.2706		-12.97	0.0010
Congestive heart failure	-0.87	0.7012		3.16	0.1308
Candidate for intervention	1.33	0.6029		6.86	0.0092
Atrial fibrillation	0.15	0.9708		5.97	0.1187
Coronary artery disease	1.90	0.6276		2.41	0.5034
Chemotherapy	24.59	0.0000		11.33	0.0000
Radiation	0.00	1.0000		0.00	#NUM!
Dialysis	-2.37	0.3648		-14.06	0.0000
Age	0.13	0.1381		0.09	0.3247
Standard deviation of age	0.16	0.2138		-0.05	0.6936
Individual measures aggregated to the facility level: non-candidates for the intervention					
Diabetes	-3.36	0.2424		-1.40	0.6004
Alzheimer's/Dementia	2.57	0.3299		2.33	0.3774
Chronic kidney disease	-3.87	0.2277		-4.06	0.2357
Indwelling catheter	-1.69	0.7108		-10.45	0.0267
Ventilator	-97.59	0.0000		38.36	0.0000
Hypertension	-1.25	0.6457		-0.76	0.7706
Cirrhosis	0.04	0.8837		2.94	0.0000
Pneumonia	-19.48	0.0000		-2.44	0.0232
Congestive heart failure	-4.16	0.1553		-1.98	0.4408
Atrial fibrillation	11.21	0.0002		4.03	0.1534
Coronary artery disease	3.93	0.2839		1.66	0.6521
Chemotherapy	-69.30	0.0000		-54.67	0.0000
Radiation	29.60	0.0000		-35.62	0.0000
Dialysis	9.93	0.0380		8.51	0.0000
Age	-0.18	0.0363		-0.29	0.0017
Standard deviation of age	-0.17	0.2567		-0.19	0.1704

PPD = Per patient day; RN = registered nurse; LPN = licensed practical nurse; CNA = certified nursing assistant; ILI = influenza like illness
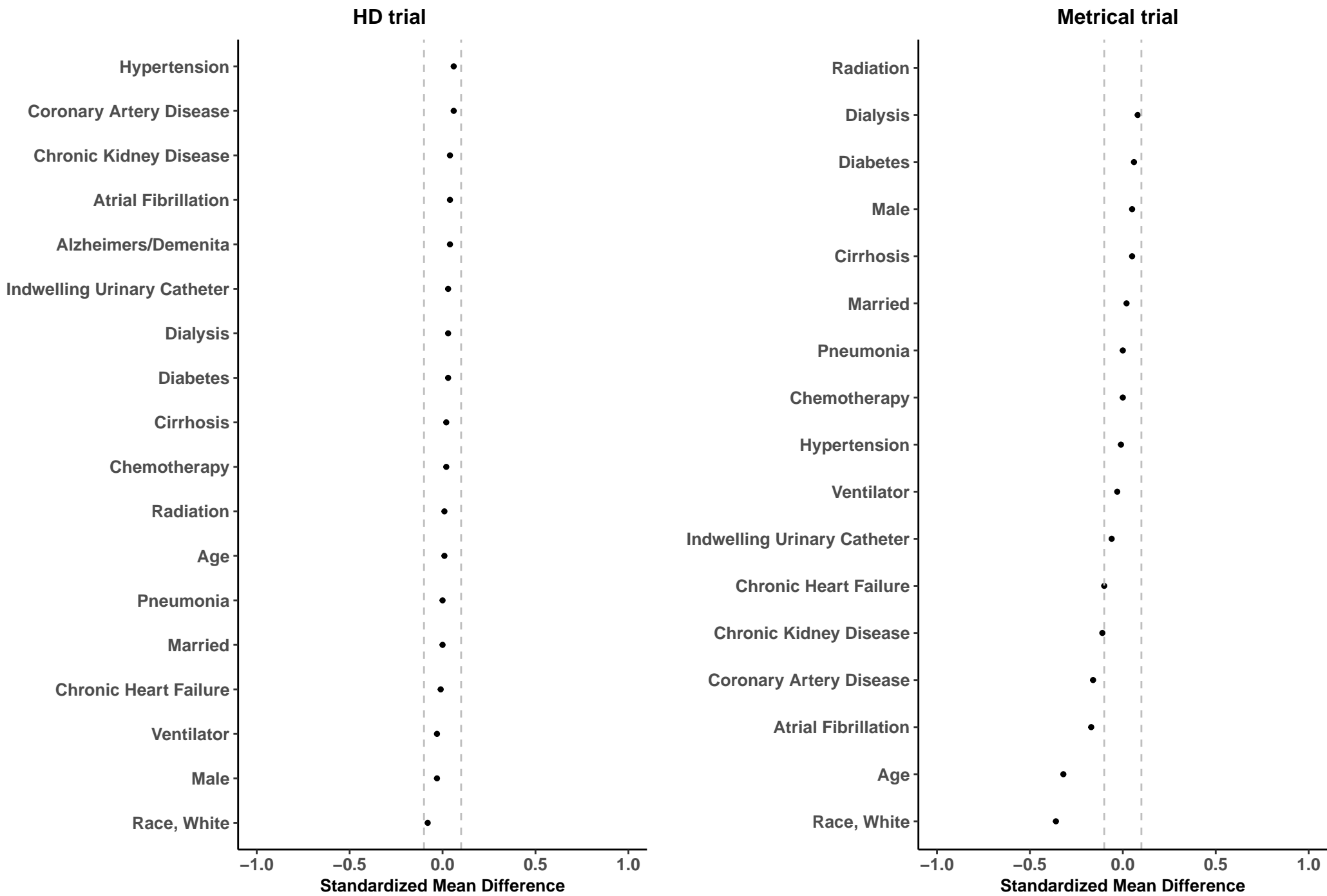
Supplemental figure 1. Standardized mean difference of individual level characteristics between individuals who are candidates for treatment residing in randomized and eligible non-randomized nursing homes
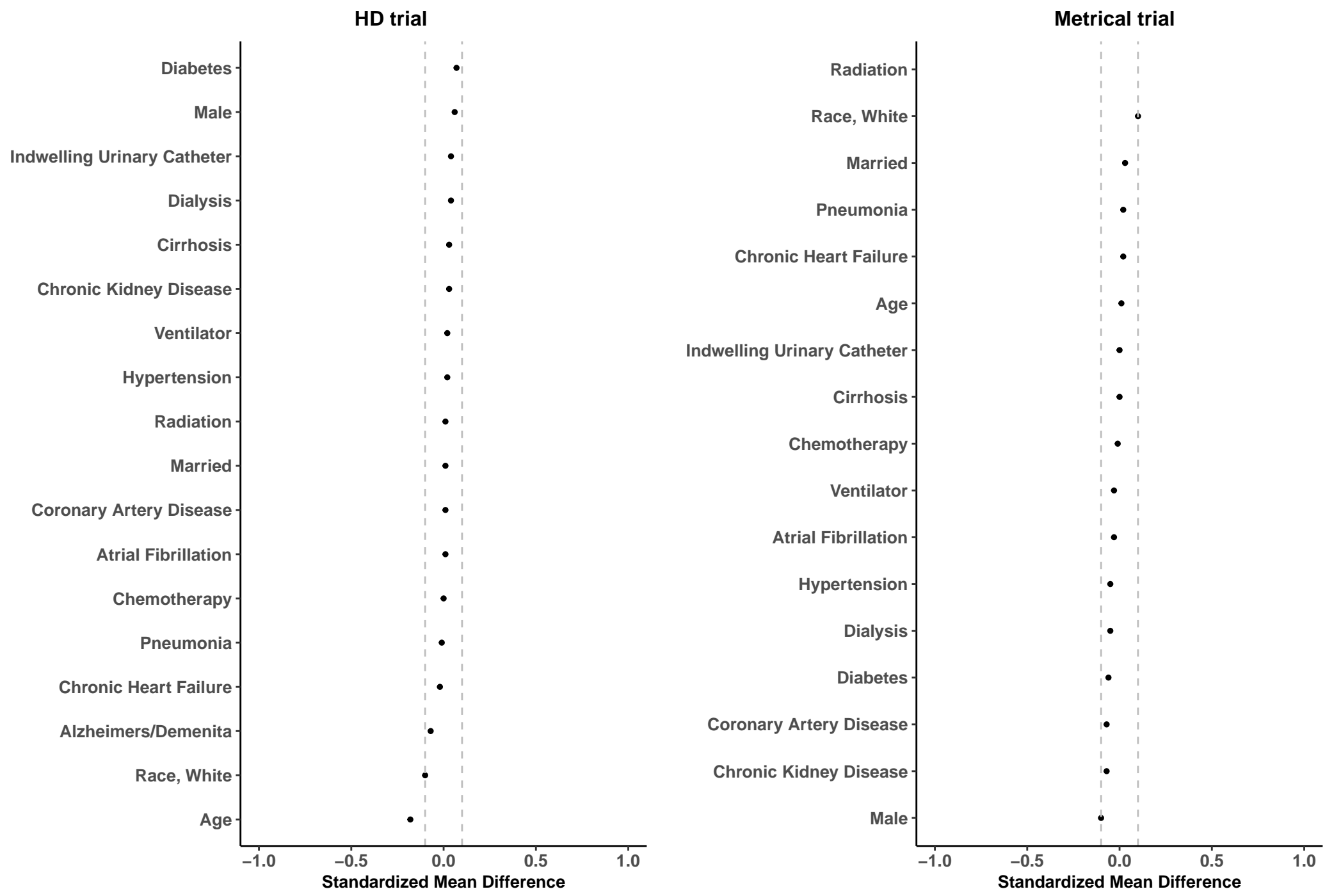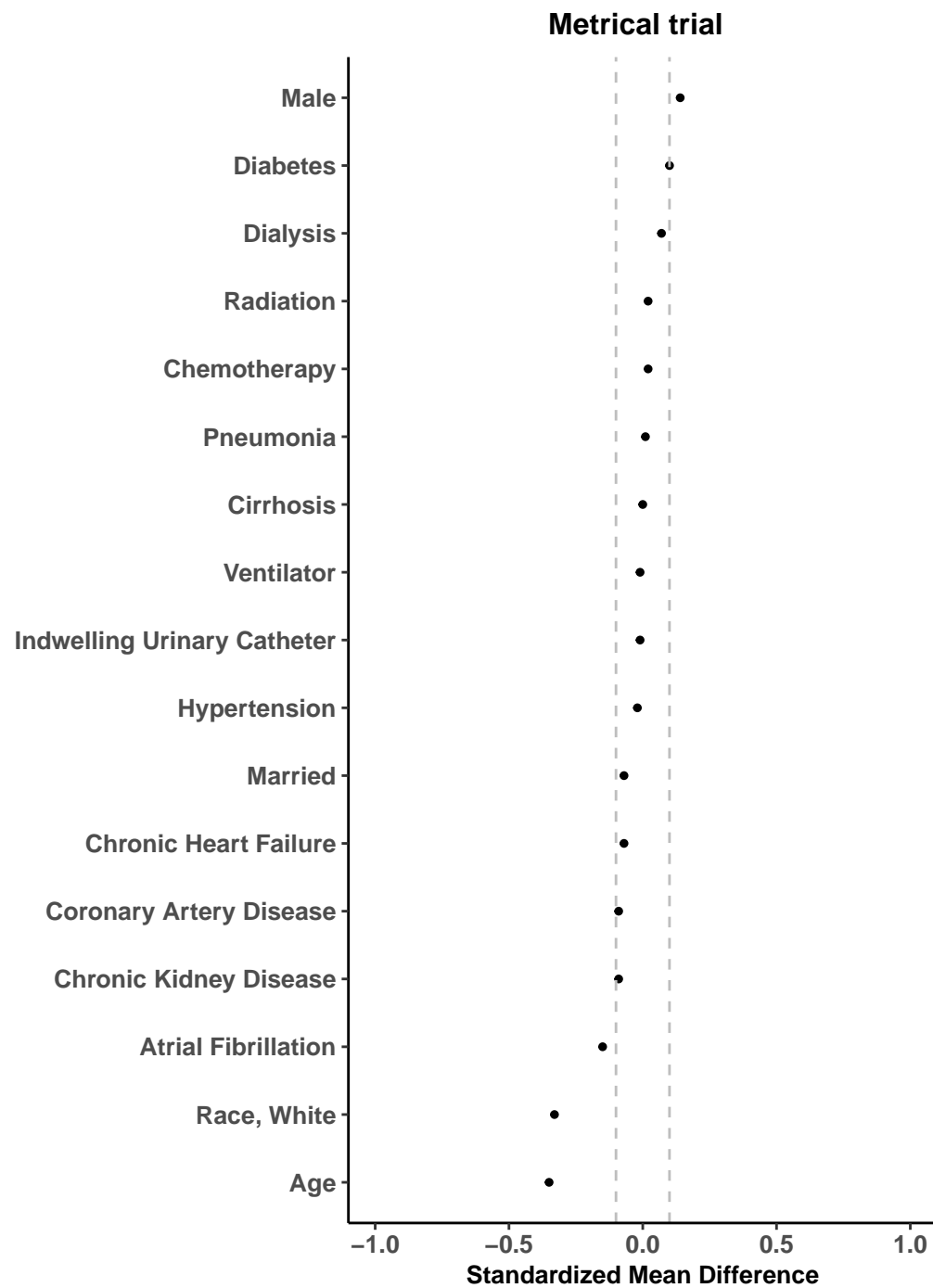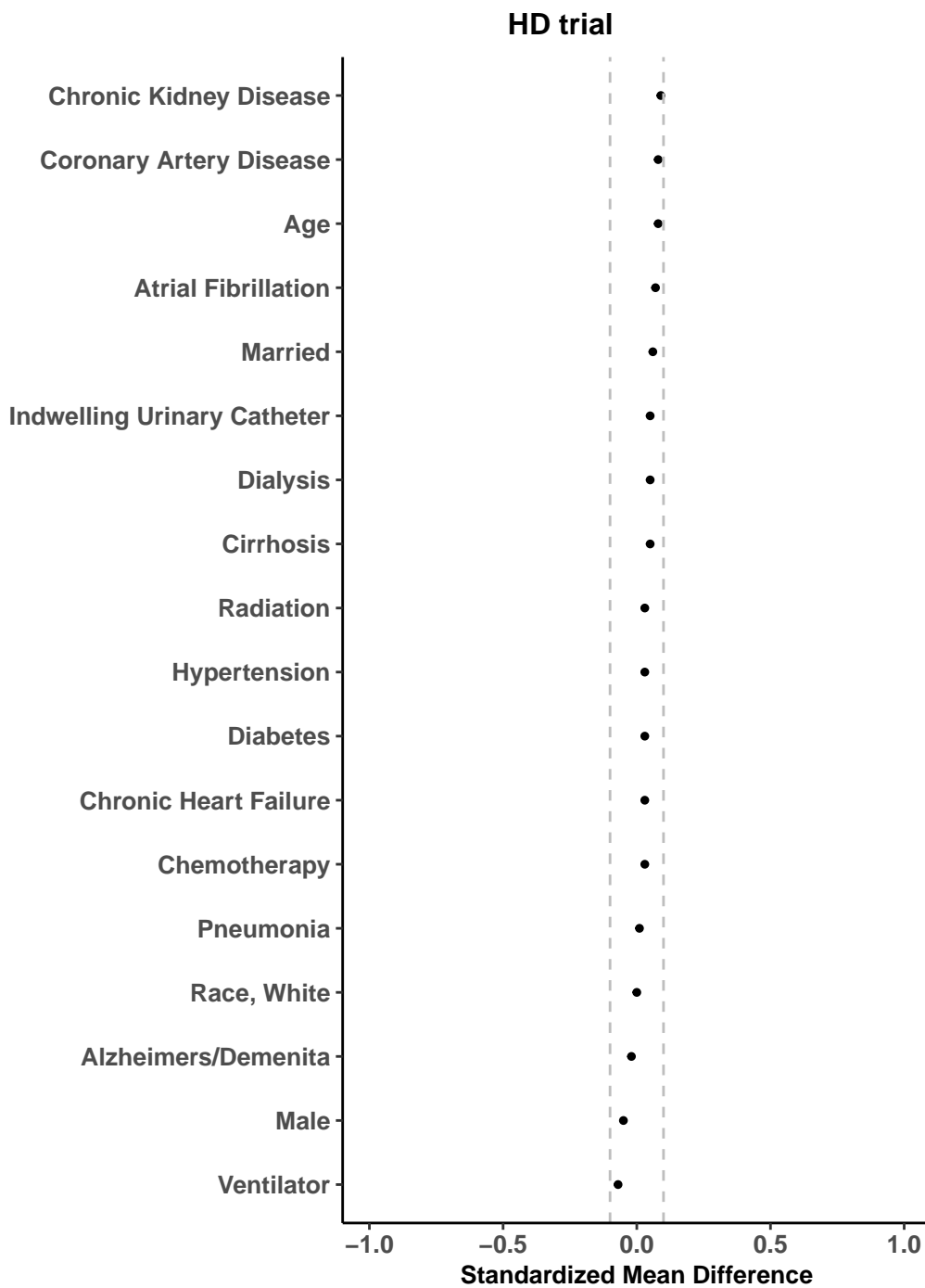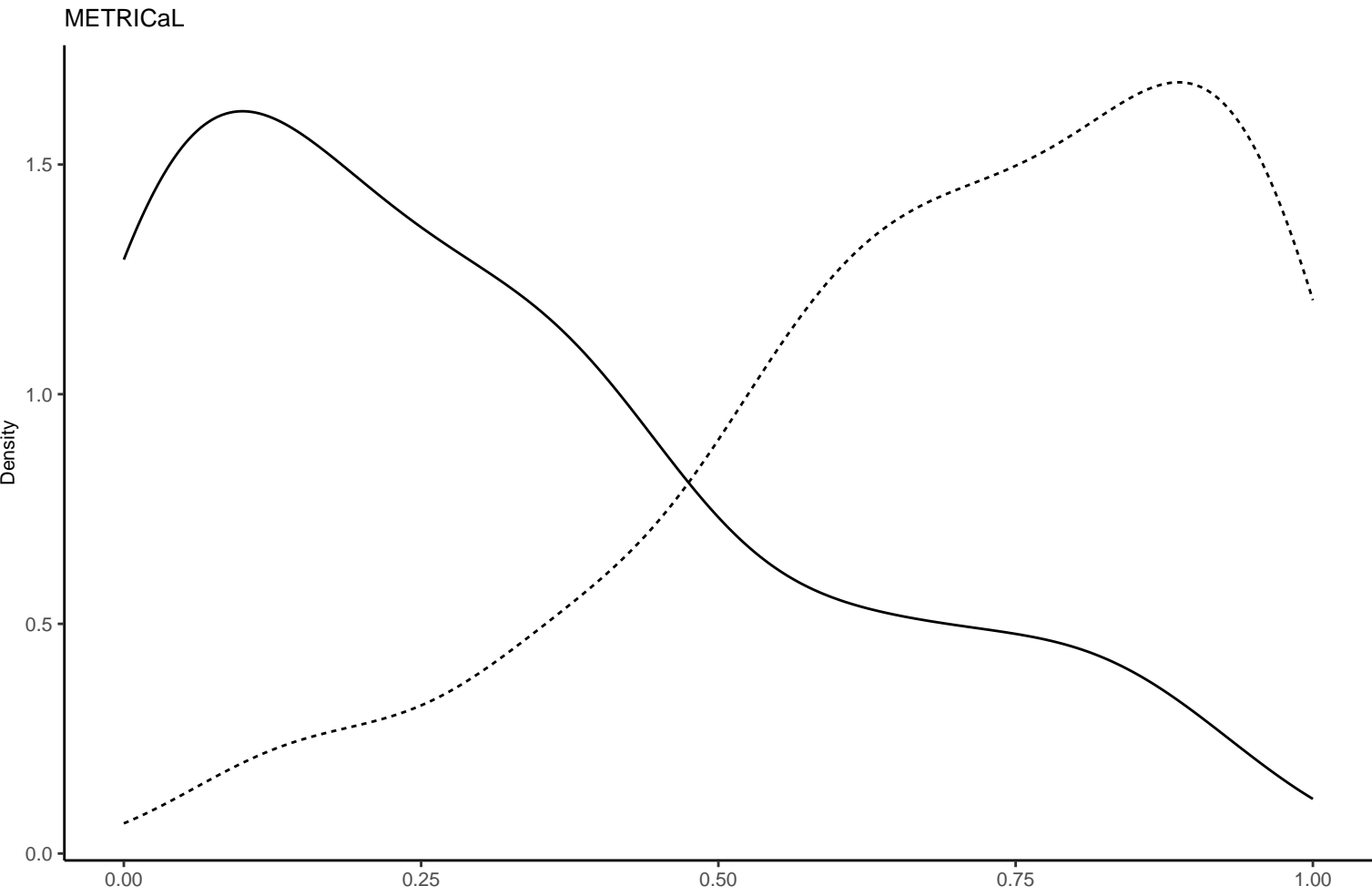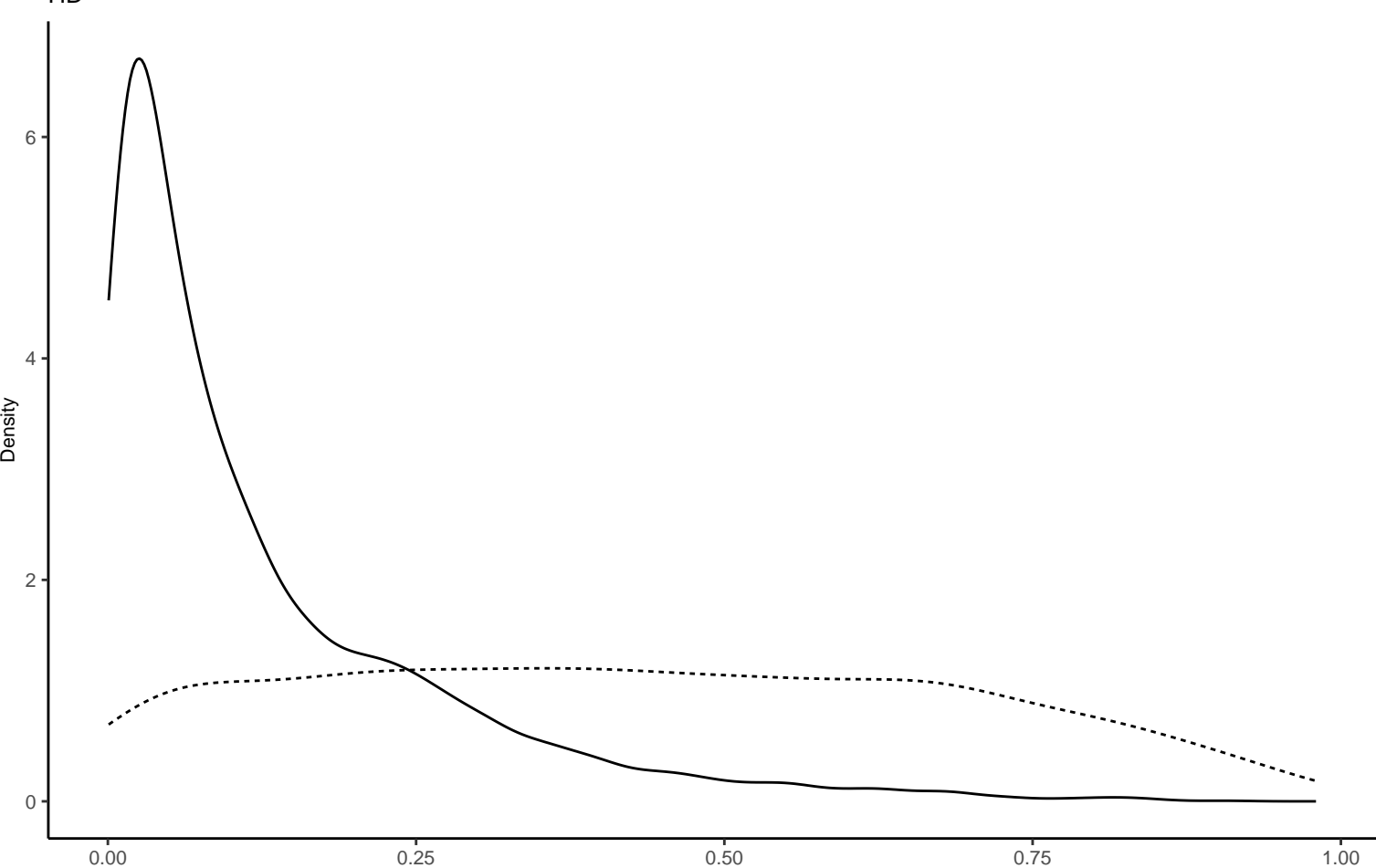
Supplemental figure 2. Standardized mean difference of individual level characteristics between individuals who are not candidates for treatment residing in randomized and eligible non-randomized nursing homes
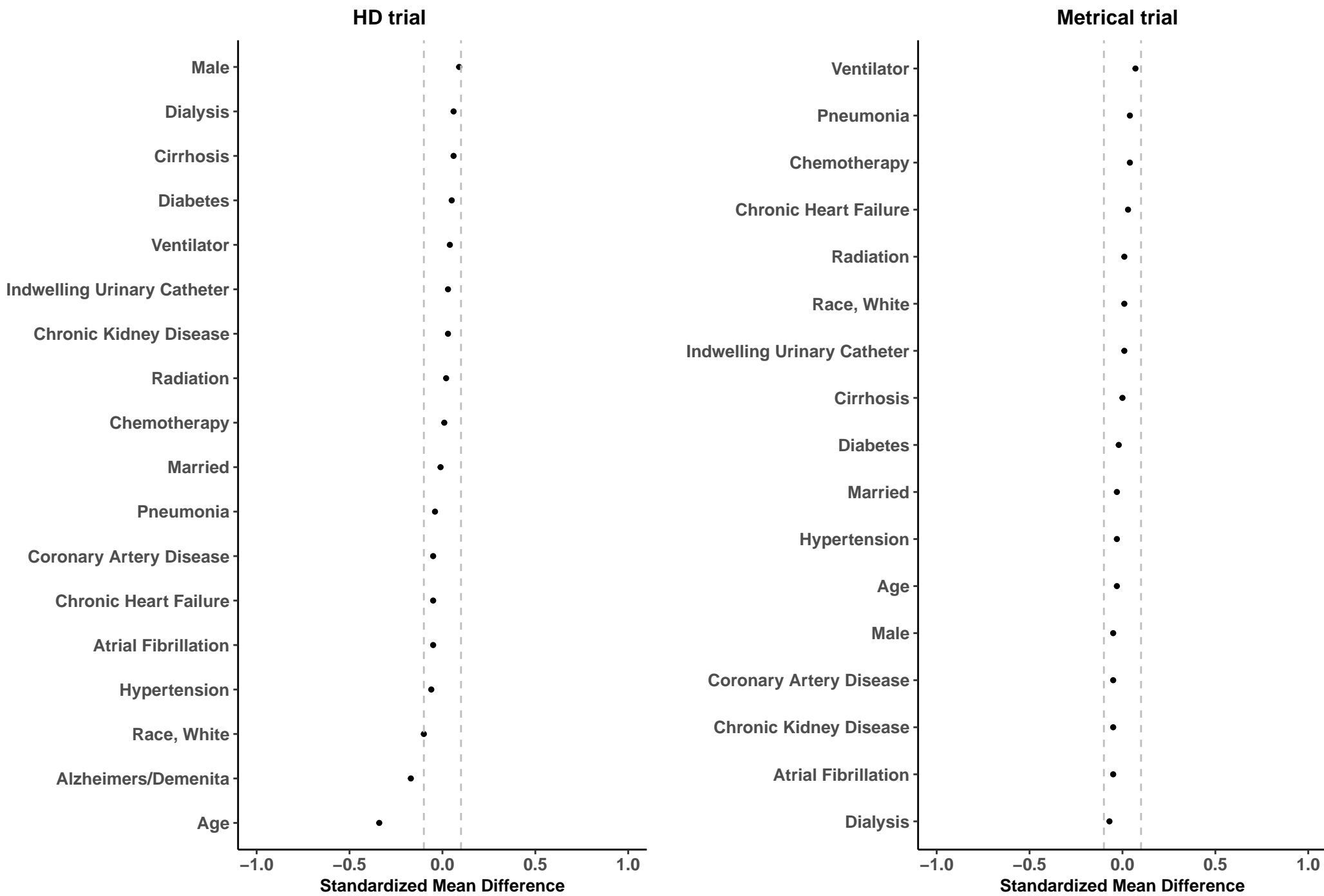
Supplemental figure 3. Standardized mean difference of individual level characteristics between individuals who are candidates for treatment residing in randomized and ineligible nursing homes

Supplemental figure 4. Standardized mean difference of individual level characteristics between individuals who are not candidates for treatment residing in randomized and ineligible nursing homes

Supplemental figure 5. Estimated probability of trial participation among all eligible nursing homes

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