

## SUPPLEMENTAL MATERIAL

### SUPPLEMENTAL TABLES

**Table S1.** Baseline characteristics of home hemodialysis patients included compared to those excluded due to missing all data on vascular access type

	<b>Included (n=2481)</b>	<b>Excluded (n=62)</b>	<b>P value<sup>a</sup></b>
Age (yr)	53±14	53±15	0.70
Sex (% male)	66	65	0.85
Diabetes mellitus (%)	60	60	0.90
Body mass index (kg/m <sup>2</sup> )	30±8	31±7	0.15
Median year of incidence	2008	2008	<0.01
Time from start of dialysis to home HD (days)	610[333,961]	271[98, 533]	<0.01
<b>Race/ethnicity (%)</b>			
White	69	68	0.85
Black	21	19	0.78
Hispanic	5	10	0.14
Asian	2	2	0.71
Other	2	2	0.72
<b>Cause of end-stage renal disease (%)</b>			
Diabetes	35	45	0.10
Hypertension	22	24	0.70
GN	19	11	0.15
Other	24	19	0.36
<b>Comorbid conditions (%)</b>			
Atherosclerotic heart disease	27	31	0.49
Congestive heart failure	50	58	0.19
Other cardiovascular diseases	22	26	0.51
<b>Primary Insurance</b>			
Medicare	40	42	0.72
Medicaid	3	5	0.51
Other	57	53	0.55
<b>Dialysis facility region</b>			
Northeast	16	10	0.16
West	20	21	0.74
Midwest	27	27	0.49
South	38	42	0.84
<b>Laboratory Data</b>			
Serum albumin (g/dl)	4.0±0.5	4.0±0.4	0.33
Serum calcium (mg/dl)	8.9±0.6	8.9±0.7	0.97
Serum parathyroid hormone (pg/ml)	338[210,534]	284[177,485]	0.19
Serum phosphorus (mg/dl)	5.1±1.2	5.0±1.2	0.43
Blood hemoglobin (g/dl)	11.2±1.3	11.1±1.3	0.61
Serum ferritin (ng/ml)	367[198,620]	403[229,550]	0.45
Serum total iron binding capacity (mg/dl)	249±48	246±44	0.64
Median ESA dose (units/week)	5084[1650,12099]	3922[1572,11322]	0.86
Iron dose (mg/month)	0[0,300]	113[1,400]	0.70
White blood cell count (x10 <sup>3</sup> /μl)	7.1±2.4	8.5±8.6	0.24
Percent lymphocyte (%)	24±8	25±13	0.31
Potassium (meq/L)	4.4±0.6	4.5±0.5	0.17
Bicarbonate, (meq/L)	24±3	23±3	0.13
Alkaline phosphatase (ug/L)	79[62,105]	75[63,106]	0.69
Creatinine (mg/dl)	7.6±3.1	8.5±3.1	0.05

Data presented as mean ± SD, median (interquartile range), or percentage. Abbreviations: HD, hemodialysis; GN, glomerulonephritis; ESA, erythropoiesis-stimulating agent

<sup>a</sup> P-values from t-test, Wilcoxon Rank Sum, or Chi-squared tests as appropriate

**Table S2.** Baseline characteristics of conventional in-center hemodialysis patients included compared to those excluded due to missing all data on vascular access type

	Included (n=114,068)	Excluded (n=4691)	P value <sup>a</sup>
Age (yr)	63±15	62±15	<0.01
Sex (% male)	56	57	0.17
Diabetes mellitus (%)	53	58	<0.01
Body mass index (kg/m <sup>2</sup> )	28±7	28±8	0.27
Median year of incidence	2009	2009	<0.01
<b>Race/ethnicity (%)</b>			
White	47	50	<0.01
Black	31	31	0.56
Hispanic	15	12	<0.01
Asian	3	3	0.74
Other	4	3	0.03
<b>Cause of end-stage renal disease (%)</b>			
Diabetes	46	43	<0.01
Hypertension	30	29	0.75
GN	9	12	<0.01
Other	15	15	0.87
<b>Comorbid conditions (%)</b>			
Atherosclerotic heart disease	14	13	0.02
Congestive heart failure	37	33	<0.01
Other cardiovascular diseases	15	14	0.16
<b>Primary Insurance</b>			
Medicare	53	55	0.01
Medicaid	7	6	0.15
Other	40	38	0.08
<b>Dialysis facility region</b>			
Northeast	12	13	0.15
West	25	22	<0.01
Midwest	18	16	0.01
South	42	41	0.18
<b>Laboratory Data</b>			
Serum albumin (g/dl)	3.5±0.5	3.5±0.5	0.08
Serum calcium (mg/dl)	8.7±0.6	8.8±0.7	<0.01
Serum parathyroid hormone (pg/ml)	314[197, 485]	249[137, 429]	<0.01
Serum phosphorus (mg/dl)	4.9±1.1	4.9±1.4	0.78
Blood hemoglobin (g/dl)	11.1±1.2	11.1±1.5	0.95
Serum ferritin (ng/ml)	281[164, 481]	308[161, 590]	<0.01
Serum total iron binding capacity (mg/dl)	225.5±49.0	217.9±52.6	<0.01
Median erythropoietin dose (units/week)	4686[1488, 11973]	4911[1547, 12009]	0.40
Iron dose (mg/month)	1000[400, 1400]	100[0, 600]	<0.01
White blood cell count (x10 <sup>3</sup> /ul)	7.8±2.7	7.8±2.8	0.81
Percent lymphocyte (%)	20.6±7.5	21.3±8.3	<0.01
Potassium (meq/L)	4.4±0.5	4.5±0.6	<0.01
Bicarbonate, (meq/L)	23.6±2.7	23.5±3.1	0.09
Alkaline phosphatase (ug/L)	87[69, 115]	89[70, 122]	<0.01
Creatinine (mg/dl)	5.8±2.4	5.9±2.6	0.07

Data presented as mean ± SD, median (interquartile range), or percentage. Abbreviations: GN, glomerulonephritis.

<sup>a</sup> P-values from t-test, Wilcoxon Rank Sum, or Chi-squared tests as appropriate

**Table S3.** Standardized differences in baseline characteristics between central venous catheter and arteriovenous fistula/graft groups in unmatched and propensity score-matched home hemodialysis cohorts

	Standardized difference	
	Unmatched cohort (n=2481)	Propensity score matched cohort
Age (yr)	0.0924	0.0654
Sex (% male)	0.1137	0.0118
Diabetes mellitus (%)	0.0263	0.0155
Body mass index (kg/m <sup>2</sup> )	-0.1433	-0.0153
Time from start of dialysis to Home HD (days)	-0.415	-0.0421
<b>Year of end-stage renal disease incidence</b>		
2007	0.052	-0.0723
2008	0.0444	0.0387
2009	-0.0283	0.0374
2010	-0.1801	-0.0228
2011	0.1099	0.0234
<b>Race/ethnicity (%)</b>		
White	0.166	0.026
Black	-0.1278	-0.0444
Hispanic	-0.1067	0.0785
Asian	0.0072	-0.0167
Other	-0.0686	0.0151
<b>Cause of end-stage renal disease (%)</b>		
Diabetes	0.0829	0
Hypertension	-0.1633	0.015
GN	0.0166	-0.0239
Other	-0.1155	-0.0085
<b>Comorbid conditions (%)</b>		0.0142
Atherosclerotic heart disease	0.0431	0.0215
Congestive heart failure	0.0809	0.0076
Other cardiovascular diseases	0.1008	-0.0134
<b>Insurance Status</b>		
Medicare	-0.0686	0.0353
Medicaid	-0.0122	-0.076
Other	-0.0145	-0.0039
<b>Dialysis facility region</b>		
Northeast	-0.0616	-0.0119
West	0.2267	-0.0863
Midwest	-0.1125	0.0311
South	-0.0833	0.0806
<b>Laboratory Data</b>		
Serum albumin (g/dl)	-0.5484	-0.0094
Serum calcium (mg/dl)	-0.1109	-0.016
Serum parathyroid hormone (pg/ml)	-0.0693	-0.022
Serum phosphorus (mg/dl)	0.0129	-0.0162
Blood hemoglobin (g/dl)	-0.1397	-0.0039
Serum ferritin (ng/ml)	0.0282	0.0234
Serum total iron binding capacity (mg/dl)	-0.216	0.0453
Median erythropoietin dose (units/week)	0.0842	-0.0066
Iron dose (mg/month)	0.1057	0.0067
White blood cell count (x10 <sup>3</sup> /μl)	0.1658	0.0328
Percent lymphocyte (%)	-0.2143	-0.0267
Potassium (meq/L)	-0.0553	-0.0085
Bicarbonate (meq/L)	0.2296	0.0462
Alkaline phosphatase (ug/L)	0.1748	-0.0044
Creatinine (mg/dl)	-0.3458	-0.06

Abbreviations: HD, hemodialysis; ESRD, end stage renal disease; GN, glomerulonephritis

**Table S4.** Censoring events over study follow-up by vascular access type at time of initiation of home hemodialysis in unmatched (n=2481) and propensity score-matched (n =1052) cohorts

Reason for Censoring	Unmatched cohort (n=2481)			Propensity score matched cohort (n=1052)	
	CVC	AV Access	Missing	CVC	AV Access
	n=579	n=1794	n=108	n=526	n=526
Discharge to non-affiliated dialysis facility	8 (1)	40 (2)	5 (5)	7 (1)	13 (2)
Discontinued dialysis	5 (1)	4 (<1)	0	5 (1)	4 (1)
Regained renal function	1 (<1)	2 (<1)	1 (1)	1 (<1)	2 (<1)
Transplant	49 (8)	139 (8)	7 (6)	46 (9)	42 (8)
Transfer to alternate modality	180 (31)	483 (27)	20 (19)	165 (31)	156 (30)
End of Follow-up/Other	258 (45)	1030 (57)	62 (57)	234 (44)	267 (51)

Abbreviations: CVC, central venous catheter; AV arteriovenous

**Table S5:** Hazard ratios for transfer to in-center hemodialysis for central venous catheter use versus arteriovenous access use in incident home hemodialysis patients (n =2481), stratified by tertiles of dialysis facility home hemodialysis central venous catheter experience

Model	Dialysis facility home HD central venous catheter experience <sup>a</sup> Hazard ratio (95% confidence interval) <sup>b</sup>		
	0-3	4-11	12-46
Matched cohort <sup>c</sup>			
Propensity score-matched	1.61 (0.97, 2.65)	1.19 (0.73, 1.96)	1.32 (0.76, 2.32)
Unmatched cohort			
Unadjusted	3.03 (1.91, 4.82)	1.66 (1.10, 2.52)	1.17 (0.75, 1.83)
Minimally adjusted <sup>d</sup>	3.09 (1.92, 4.99)	1.66 (1.09, 2.51)	1.19 (0.76, 1.89)
Fully adjusted <sup>e</sup>	2.27 (1.37, 3.75)	1.29 (0.82, 2.02)	1.19 (0.73, 1.96)

Abbreviations: HD, hemodialysis

<sup>a</sup> Defined by number of incident 91-day patient-periods of central venous catheter use by HHD patients

<sup>b</sup> Reference group HHD patients with arteriovenous access; hazard ratios are subdistribution hazard ratios from competing risks regression

<sup>c</sup> Propensity score matched cohort included 1052 patients (CVC, n = 526; AV access, n = 526)

<sup>d</sup> Data adjusted for age, sex, diabetes, and race and/or ethnicity

<sup>e</sup> Data adjusted for demographic characteristics above, plus duration of dialysis treatment prior to start of home HD, dialysis facility home HD experience, body mass index, serum albumin, serum creatinine, and blood hemoglobin.

**Table S6:** Characteristics of unmatched ( $n = 114,068$ ) and propensity score-matched ( $n = 44,862$ ) conventional in-center hemodialysis study cohorts stratified by initial vascular access type at the time of initiation of dialysis

Characteristics	Unmatched Cohort		Propensity Score Matched Cohort	
	CVC (n=91304)	AV Access (n=22764)	CVC (n=22431)	AV Access (n=22431)
Age (yr)	62±15	64±14	64±15	64±14
Sex (% male)	56	60	60	60
Diabetes mellitus (%)	46	56	57	57
Body mass index (kg/m <sup>2</sup> )	28±7	28±7	28±8	28±7
<b>Race/ethnicity (%)</b>				
White	47	50	50	50
Black	31	30	30	30
Hispanic	15	12	12	12
Asian	3	4	4	4
Other	4	4	4	4
<b>Cause of end-stage renal disease</b>				
Diabetes	46	46	47	46
Hypertension	29	30	30	31
GN	10	8	8	8
Other	15	15	15	15
<b>Comorbid conditions (%)</b>				
Atherosclerotic heart disease	15	14	14	14
Congestive heart failure	38	34	34	35
Other cardiovascular diseases	16	14	14	14
<b>Primary Insurance</b>				
Medicare	53	53	53	53
Medicaid	7	5	6	5
Other	39	41	41	41
<b>Dialysis facility region</b>				
Northeast	12	16	16	16
West	26	25	25	25
Midwest	19	17	17	17
South	43	41	42	42
<b>Laboratory Data</b>				
Serum albumin (g/dl)	3.5±0.5	3.7±0.4	3.7±0.5	3.7±0.4
Serum calcium (mg/dl)	8.7±0.6	8.8±0.6	8.8±0.6	8.8±0.6
Serum parathyroid hormone (pg/ml)	320[201,497]	288[185,440]	303[195,458]	289[185,441]
Serum phosphorus (mg/dl)	4.9±1.2	4.9±1.1	4.9±1.1	4.9±1.1
Blood hemoglobin (g/dl)	11.1±1.2	11.2±1.1	11.2±1.2	11.2±1.1
Serum ferritin (ng/ml)	293[170,500]	240[142,408]	255[153,420]	241[142,410]
Serum total iron binding capacity (mg/dl)	222 ±49	240±47	240±49	239±47
Median erythropoietin dose (units/week)	4713[1493,12000]	4627[1467,11733]	4636[1414,11826]	4620[1467,11677]
Iron dose (mg/month)	1000[400,1400]	1050[550,1500]	1000[500,1500]	1050[525,1500]
White blood cell count (x10 <sup>3</sup> /ul)	7.9±2.7	7.3±2.4	7.4±2.2	7.4±2.4
Percent lymphocyte (%)	20±7	22±8	22±8	22±8
Potassium (meq/L)	4.4±0.5	4.4±0.5	4.4±0.5	4.4±0.5
Bicarbonate, (meq/L)	24±3	23±3	23±3	23±3
Alkaline phosphatase (ug/L)	88[70,117]	82[65,106]	83[66,107]	82[65,106]
Creatinine (mg/dl)	5.8±2.4	5.9±2.1	5.9±2.4	5.9±2.1

Abbreviations: CVC, central venous catheter; AV, arteriovenous; GN, glomerulonephritis.

**Table S7.** Standardized differences in baseline characteristics between central venous catheter and arteriovenous fistula/graft groups in unmatched and propensity score-matched conventional in-center hemodialysis cohorts

	Standardized difference	
	Unmatched cohort (n=114,068)	Propensity score matched cohort (n=44862)
Age (yr)	-0.1196	-0.0115
Sex (% male)	0.09	0.0032
Diabetes mellitus (%)	0.0492	-0.0055
Body mass index (kg/m <sup>2</sup> )	-0.0379	0.0076
<b>Year of end-stage renal disease incidence</b>		
2007	0.0371	-0.0016
2008	0.0298	-0.0015
2009	0.0144	0.0002
2010	-0.0304	0.0089
2011	-0.0511	-0.0065
<b>Race/ethnicity (%)</b>		
White	-0.072	-0.0004
Black	0.0131	0.0027
Hispanic	-0.0217	-0.0036
Asian	0.0964	-0.0023
Other	0.0056	0.0076
<b>Cause of end-stage renal disease (%)</b>		
Diabetes	-0.0128	0.0118
Hypertension	-0.0232	-0.0182
GN	0.0482	0.0018
Other	-0.1363	0.0063
<b>Comorbid conditions (%)</b>		
Atherosclerotic heart disease	0.0141	0.0001
Congestive heart failure	0.0803	-0.0017
Other cardiovascular diseases	0.0519	0.0008
<b>Insurance Status</b>		
Medicare	0.0044	0.0024
Medicaid	0.0802	0.0084
Other	-0.0442	-0.0063
<b>Dialysis facility region</b>		
Northeast	-0.1228	-0.0055
West	0.0083	-0.0055
Midwest	0.0421	-0.0055
South	0.0351	-0.0055
<b>Laboratory Data</b>		
Serum albumin (g/dl)	-0.4655	-0.0035
Serum calcium (mg/dl)	-0.2099	0.002
Serum parathyroid hormone (pg/ml)	0.1436	0.0148
Serum phosphorus (mg/dl)	0.0489	-0.0016
Blood hemoglobin (g/dl)	-0.1196	-0.0128
Serum ferritin (ng/ml)	0.2103	0.0181
Serum total iron binding capacity (mg/dl)	-0.3823	0.0074
Median erythropoietin dose (units/week)	0.0091	0.0033
Iron dose (mg/month)	-0.1489	-0.0036
White blood cell count (x10 <sup>3</sup> /μl)	0.2368	0.0134
Percent lymphocyte (%)	-0.1967	0.0013
Potassium (meq/L)	0.0502	-0.0055
Bicarbonate, (meq/L)	0.3089	-0.006
Alkaline phosphatase (ug/L)	0.1733	0.0085
Creatinine (mg/dl)	-0.0386	0.0033

Abbreviations: GN, glomerulonephritis

**Table S8:** Sensitivity analysis: hazard ratios for all-cause mortality, hospitalization, and transfer to in-center HD for central venous catheter use versus arteriovenous access use at the time of start of home HD in incident home HD patients (n = 2481)

Model	Hazard ratio (95% confidence interval) <sup>a</sup>		
	All-cause mortality	Hospitalization	Transfer to in-center HD
Unmatched cohort			
Unadjusted	2.43 (1.80, 3.29)	1.63 (1.44, 1.85)	1.16 (0.92, 1.45)
Minimally adjusted <sup>b</sup>	2.25 (1.67, 3.05)	1.28 (1.13, 1.45)	1.17 (0.93, 1.47)
Fully adjusted <sup>c</sup>	1.67 (1.21, 2.31)	1.40 (1.22, 1.61)	1.09 (0.85, 1.39)

All models adjusted for calendar 91-day period. Abbreviations: HD, hemodialysis

<sup>a</sup> Reference group home HD patients with arteriovenous access; HRs are subdistribution hazard ratios

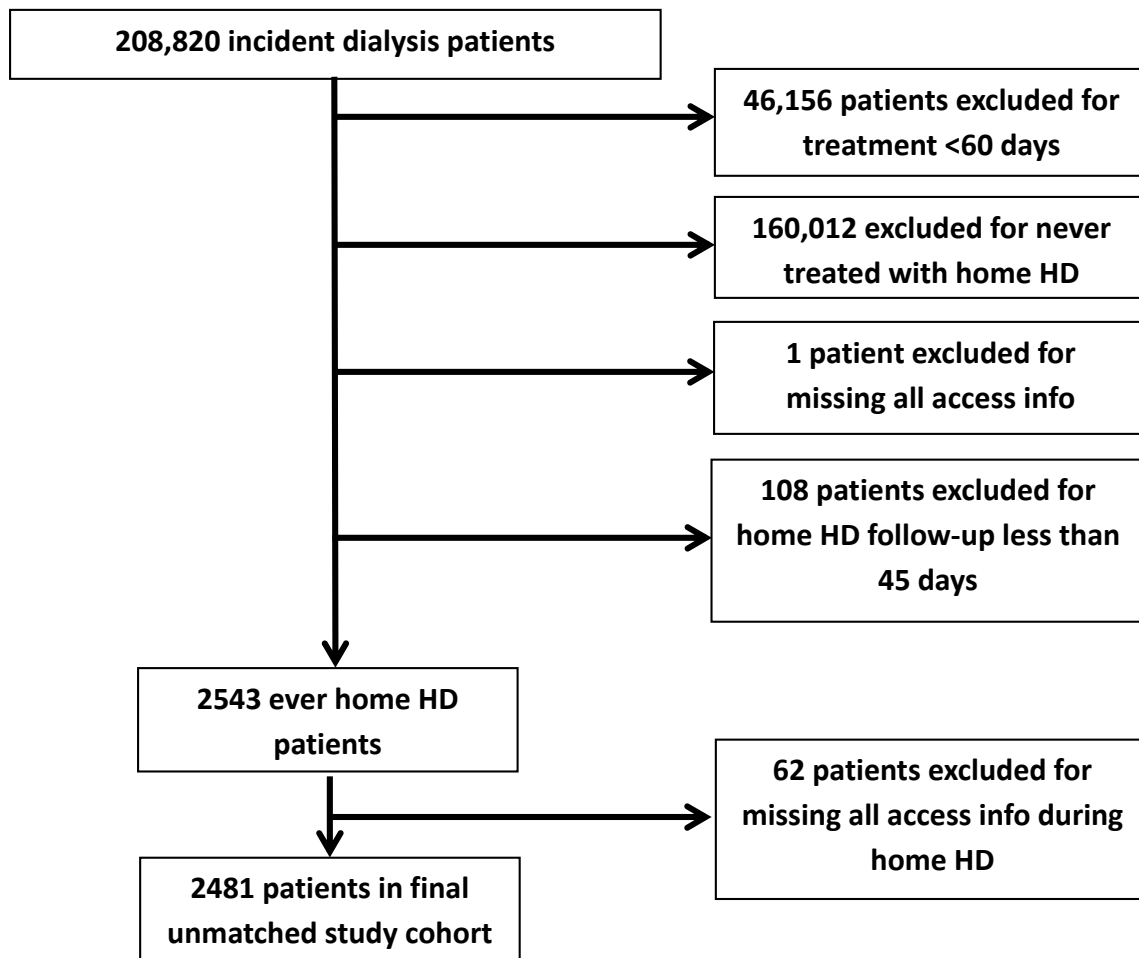
<sup>b</sup> Data adjusted for age, sex, diabetes, and race and/or ethnicity.

<sup>c</sup> Data adjusted for demographic characteristics above, plus duration of dialysis treatment prior to start of home HD, dialysis facility home HD experience, body mass index, serum albumin, serum creatinine, and blood hemoglobin.

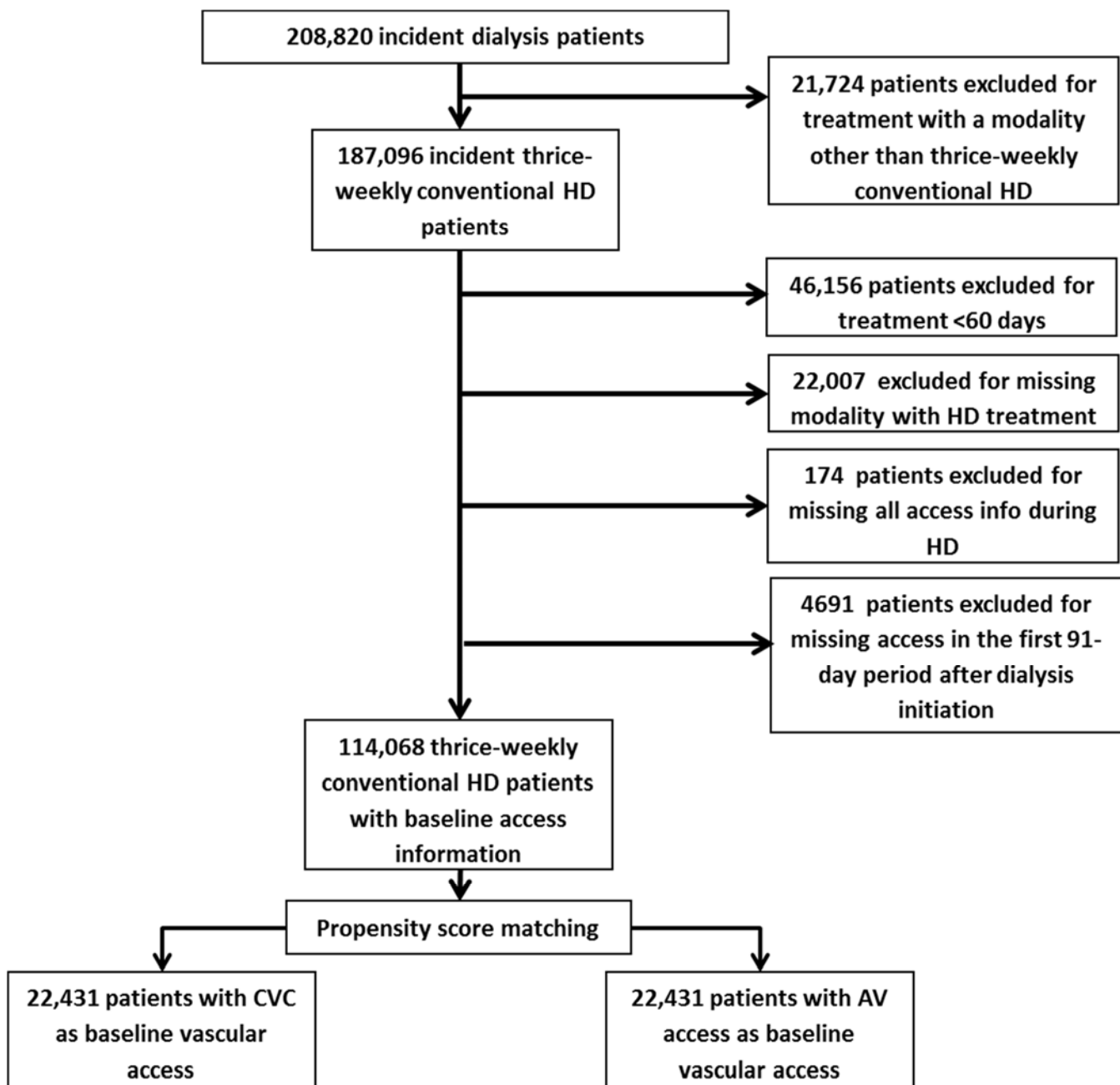


## SUPPLEMENTAL FIGURES

**Figure S1.** Construction of unmatched incident home hemodialysis (HD) study cohort. Abbreviations: HD, hemodialysis



**Figure S2. Construction of propensity score-matched conventional in-center HD cohort.** Abbreviations: HD, hemodialysis; CVC, central venous catheter; AV, arteriovenous



**Figure S3. Association of vascular access type with adjusted risk of transfer to in-center hemodialysis in unmatched cohort of patients undergoing home hemodialysis, stratified by tertiles of dialysis facility central venous catheter experience.** Reference group: arteriovenous access. Hazard ratios for unadjusted, minimally adjusted and fully adjusted models are sub-distribution hazard ratios. Abbreviations: HD, hemodialysis; CVC, central venous catheter

