Supplemental Index

Supplemental Table 1. Risks of outcomes in the subgroups of the Non-Classified Group versus the Iron Replete Group.

Group	Mortality Full Model	Heart Failure Full Model	ESRD Full Model	ASCVD Full Model
Iron Replete (N = 1014)	Reference	Reference	Reference	Reference
Non-classified Group 1 (NC1, N = 523)	1.08 (0.86 – 1.34)	0.93 (0.70 – 1.23)	0.90 (0.72 – 1.13)	0.82 (0.63 – 1.08)
Non-classified Group 2 (NC2, N = 447)	1.01 (0.80 – 1.28)	0.97 (0.72 – 1.30)	0.99 (0.79 – 1.25)	0.75 (0.56 – 1.01)
Non-classified Group 3 (NC3, N = 482)	1.18 (0.97 – 1.44)	0.88 (0.69 – 1.14)	1.11 (0.90 – 1.37)	0.84 (0.65 – 1.08)

Results are reported as hazard ratios compared to the referent group.

Results for Iron Deficiency, Mixed Iron Deficiency, Functional Iron Deficiency and High Iron are presented in Table 2.

Full Model: Stratified by center, adjusted for age, sex, race, ethnicity, diabetes, smoking, systolic blood pressure, body mass index, history of cardiovascular disease, estimated glomerular filtration rate, urinary albumin-to-creatinine ratio, and erythropoietin use

Supplemental Table 2. Iron stores and incident heart failure and atherosclerotic cardiovascular disease

Group	Unadjusted Model HR (95% CI)	Demographics Model HR (95% CI)	Full Model HR (95% CI)	Full Model + CRP HR (95% CI)	Full Model + oral iron HR (95% CI)	Full Model + Phosphate binder use HR (95% CI)
Incident Heart Failure (550 events in 3395 individuals at risk)						
Iron Replete	Reference	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	1.33 (1.00, 1.77)	1.47 (1.11, 1.96)	1.29 (0.97, 1.72)	1.28 (0.96, 1.71)	1.29 (0.97, 1.72)	1.29 (0.97, 1.72)
Mixed Iron Deficiency	1.49 (1.07, 2.08)	1.38 (0.98, 1.92)	1.36 (0.97, 1.91)	1.34 (0.95, 1.88)	1.36 (0.96, 1.91)	1.36 (0.97, 1.91)
Functional Iron Deficiency	1.48 (1.09, 2.00)	1.30 (0.96, 1.77)	1.21 (0.89, 1.65)	1.14 (0.83, 1.56)	1.21 (0.89, 1.65)	1.21 (0.89, 1.65)
High Iron	1.43 (1.07, 1.91)	1.51 (1.13, 2.02)	1.79 (1.33, 2.42)	1.82 (1.35, 2.46)	1.79 (1.33, 2.41)	1.79 (1.33, 2.42)
Incident Atherosclerotic Cardiovascular Disease (297 events in 2509 individuals at risk)						
Iron Replete	Reference	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	0.87 (0.57, 1.32)	1.02 (0.67, 1.55)	0.97 (0.63, 1.49)	0.93 (0.61, 1.43)	0.97 (0.63, 1.49)	0.97 (0.63, 1.49)
Mixed Iron Deficiency	0.82 (0.48, 1.39)	0.80 (0.47, 1.36)	0.83 (0.49, 1.42)	0.76 (0.45, 1.30)	0.83 (0.49, 1.42)	0.83 (0.49, 1.42)
Functional Iron Deficiency	1.01 (0.64, 1.59)	0.91 (0.58, 1.43)	0.88 (0.56, 1.39)	0.76 (0.48, 1.21)	0.88 (0.55, 1.39)	0.88 (0.56, 1.39)
High Iron	1.29 (0.89, 1.88)	1.27 (0.87, 1.86)	1.36 (0.92, 2.00)	1.41 (0.96, 2.08)	1.37 (0.93, 2.01)	1.36 (0.93, 2.01)

Results are reported as hazard ratios compared to the referent group. For incident heart failure, individuals with self-reported heart failure at baseline were excluded. For incident ASCVD, individuals with self-reported CVD at baseline were excluded.

Demographics Model: Stratified by center, adjusted for age, sex, race, and ethnicity

Full Model: Demographics model plus diabetes, smoking, systolic blood pressure, body mass index, history of cardiovascular disease, estimated glomerular filtration rate, urinary albumin-to-creatinine ratio, and erythropoietin use

Abbreviations: CRP, C-reactive protein; FGF23, fibroblast growth factor 23

Supplemental Table 3. Baseline characteristics according to iron groups using clinical thresholds

	Iron Replete N=1029 (27.5%)	Iron Deficiency N=666 (17.8%)	Functional iron deficiency N=810 (21.6%)	High Iron N=69 (1.8%)	Non-Classified N=1173 (31.3%)
Age, years	57.9 ± 11.2	56.8 ± 11.6	58.8 ± 10.1	54.7 ± 10.7	57.4 ± 11.0
Female, %	38.4	64.9	44.9	31.9	40.9
Black, %	37.3	40.4	54.2	33.3	39.7
Hispanic, %	12.1	15.6	11.6	11.6	13.0
Current smoking, %	13.2	13.8	13.6	18.8	11.9
BMI, kg/m^2	31.4 ± 6.8	33.5 ± 9.4	33.7 ± 8.5	29.4 ± 6.4	31.0 ± 6.9
Systolic BP, mmHg	127.5 ± 22.2	129.8 ± 22.5	130.0 ± 666 21.6	126.2 ± 23.2	127.8 ± 22.4
Hypertension, %	85.5	86.9	89.3	84.1	84.5
Diabetes, %	43.1	53.6	57.0	39.1	45.7
Heart failure, %	8.4	10.2	10.9	5.8	9.0
Stroke, %	9.9	11.1	10.7	8.7	8.3
CVD, %	31.5	35.3	36.4	24.6	31.3
Oral iron use, %	38.3	39.8	32.8	42.0	34.6
ESA, %	3.1	3.5	4.3	10.3	4.2
Hemoglobin, g/dL	13.0 ± 1.7	11.9 ± 1.7	12.2 ± 1.7	12.8 ± 2.3	12.9 ± 1.7
Iron, ug/dL	99.7 ± 31.8	60.2 ± 20.9	66.3 ± 23.9	168.6 ± 49.5	109.7 ± 38.9

TSAT, %	26.6 ± 4.8	14.4 ± 3.8	16.3 ± 2.8	48.6 ± 9.5	28.6 ± 7.1
Ferritin, ng/mL	180.4 (136.0–228.0)	54.1 (33.4–73.6)	197.6 (140.5–299.3)	525.4 (376.4–857.6)	302.4 (71.1–430.1)
CRP, mg/L	2.0 (0.9 – 4.5)	3.2 (1.2 – 8.0)	4.5 (1.8 – 9.7)	2.0 (0.8 – 4.4)	2.1 (0.9 – 5.1)
eGFR, ml/min/1.73m^2	44.9 ± 14.7	44.2 ± 15.2	41.8 ± 14.3	43.3 ± 16.5	45.5 ± 15.3
UACR, ug/mg	49.1 (7.7 – 426.5)	53.1 (9.7 – 420.0)	76.8 (12.4 – 514.2)	128.8 (20.2 – 1082.8)	39.1 (6.9 – 471.9)
Serum albumin, g/dL	4.0 ± 0.5	3.8 ± 0.4	3.9 ± 0.5	3.8 ± 0.8	3.9 ± 0.5
Phosphate, mg/dL	3.7 ± 0.7	3.8 ± 0.7	3.8 ± 0.7	3.9 ± 0.7	3.7 ± 0.7
FGF23, RU/ml	126.5 (89.7 – 197.2)	201.8 (130.7 – 380.5)	155.7 (104.4 – 252.9)	145.0 (90.0 – 235.4)	130.4 (87.4 – 208.4)
PTH, pg/ml	49.8 (34.0 – 84.0)	57.0 (35.1 – 94.0)	60.6 (37.0 – 105.0)	55.9 (36.9 – 93.0)	52.0 (34.0 – 83.9)

Results are reported as means ± standard deviations, medians with interquartile ranges or percentiles.

Abbreviations: N, number; BMI, body mass index; BP, blood pressure; CVD, cardiovascular disease; ESA, erythropoietin stimulating agents; TSAT, transferrin saturation; CRP, C-reactive protein; eGFR, estimated glomerular filtration rate; UACR, urine albumin-to-creatinine ratio

Supplemental Table 4. Iron groups defined by clinical thresholds and risks of mortality and cardiovascular events

Group	Incidence Density (95% CI)	Demographics Model HR (95% CI)	Full Model HR (95% CI)	Full Model + oral iron use HR (95% CI)	Full Model + CRP HR (95% CI)	Full Model + Phosphate Binder Use HR (95% CI)
All-cause Mortality: 1104 events over median follow-up of 9.5 years						
Iron Replete	2.80 (2.46 – 3.16)	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	3.46 (2.99 – 3.98)	1.37 (1.14 – 1.66)	1.30 (1.08 – 1.58)	1.30 (1.08 – 1.58)	1.24 (1.02 – 1.50)	1.30 (1.08 – 1.58)
Functional Iron Deficiency	4.24 (3.77 – 4.76)	1.37 (1.16 – 1.63)	1.31 (1.10 – 1.55)	1.31 (1.10 – 1.56)	1.17 (0.98 – 1.39)	1.31 (1.10 – 1.55)
High Iron	4.40 (2.82 – 6.54)	2.02 (1.33 – 3.07)	1.91 (1.25 – 2.92)	1.92 (1.26 – 2.93)	1.92 (1.26 – 2.94)	1.91 (1.26 – 2.92)
Heart Failure: 728 events over median follow-up of 8.8 years						
Iron Replete	2.20 (1.88 – 2.54)	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	2.87 (2.41 – 3.39)	1.35 (1.08 – 1.70)	1.20 (0.95 – 1.51)	1.20 (0.95 – 1.51)	1.18 (0.93 – 1.48)	1.19 (0.95 – 1.50)
Functional Iron Deficiency	3.25 (2.81 – 3.75)	1.28 (1.04– 1.58)	1.16 (0.94 – 1.42)	1.15 (0.93 – 1.42)	1.10 (0.89 – 1.36)	1.16 (0.94 – 1.42)
High Iron	4.14 (2.49 – 6.46)	2.37 (1.47 – 3.81)	2.41 (1.48 – 3.94)	2.41 (1.48 – 3.94)	2.39 (1.46 – 3.90)	2.42 (1.48 – 3.95)
End Stage Renal Disease: 1041 events over median follow-up of 8.8 years						
Iron Replete	3.60 (3.19 – 4.04)	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	3.67 (3.15 – 4.25)	1.04 (0.86 – 1.25)	1.01 (0.83 – 1.23)	1.01 (0.83 – 1.23)	1.02 (0.84 – 1.24)	1.01 (0.83 – 1.23)
Functional Iron Deficiency	4.46 (3.93 – 5.04)	1.11 (0.93 – 1.31)	1.05 (0.89 – 1.25)	1.05 (0.89 – 1.25)	1.06 (0.89 – 1.27)	1.05 (0.89 – 1.25)
High Iron	5.94	1.69	1.62	1.62	1.61	1.62

Group	Incidence Density (95% CI)	Demographics Model HR (95% CI)	Full Model HR (95% CI)	Full Model + oral iron use HR (95% CI)	Full Model + CRP HR (95% CI)	Full Model + Phosphate Binder Use HR (95% CI)
	(3.88 – 8.70)	(1.13 – 2.53)	(1.06 – 2.45)	(1.07 – 2.46)	(1.06 – 2.44)	(1.07 – 2.46)
Atherosclerotic Cardiovascular Disease: 673 events over median follow-up of 8.8 years						
Iron Replete	2.28 (1.97 – 2.64)	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	2.22 (1.82 – 2.68)	1.08 (0.85 – 1.38)	0.99 (0.78 – 1.27)	0.99 (0.78 – 1.26)	0.95 (0.75 – 1.21)	0.99 (0.78 – 1.27)
Functional Iron Deficiency	2.90 (2.49 – 3.37)	1.19 (0.96 – 1.47)	1.12 (0.91 – 1.39)	1.12 (0.91 – 1.39)	1.01 (0.81 – 1.26)	1.12 (0.91 – 1.39)
High Iron	2.46 (1.27 – 4.30)	1.30 (0.72 – 2.34)	1.16 (0.63 –2.14)	1.16 (0.63 – 2.14)	1.13 (0.61 – 2.08)	1.16 (0.63 – 2.15)

Results are reported as hazard ratios compared to the referent group.

Demographics Model: Stratified by center, adjusted for age, sex, race, and ethnicity

Full Model: Demographics model plus diabetes, smoking, systolic blood pressure, body mass index, history of cardiovascular disease, estimated glomerular filtration rate, urinary albumin-to-creatinine ratio, and erythropoietin use

Abbreviations: HR, hazard ratio; CI, confidence interval; CRP, C-reactive protein

Supplemental Table 5. Iron groups defined by clinical thresholds and risks of mortality and cardiovascular events with adjustment for FGF23, Hemoglobin and PTH

Group	Demographics Model HR (95% CI)	Full Model HR (95% CI)	Full Model + cFGF23 HR (95% CI)	Full Model + Hemoglobin HR (95% CI)	Full Model + PTH HR (95% CI)
All-cause Mortality: 1104 events over median follow-up of 9.5 years					
Iron Replete	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	1.37 (1.14 – 1.66)	1.30 (1.08 – 1.58)	1.04 (0.85 – 1.27)	1.24 (1.02 – 1.51)	1.30 (1.07 – 1.57)
Functional Iron Deficiency	1.37 (1.16 – 1.63)	1.31 (1.10 – 1.55)	1.23 (1.04 – 1.47)	1.26 (1.06 – 1.50)	1.32 (1.11 – 1.56)
High Iron	2.02 (1.33 – 3.07)	1.91 (1.25 – 2.92)	1.92 (1.26 – 2.93)	1.86 (1.22 – 2.83)	1.86 (1.22 – 2.85)
Heart Failure: 728 events over median follow-up of 8.8 years					
Iron Replete	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	1.35 (1.08 – 1.70)	1.20 (0.95 – 1.51)	0.91 (0.71 – 1.15)	1.11 (0.88 – 1.40)	1.20 (0.95 – 1.52)
Functional Iron Deficiency	1.28 (1.04– 1.58)	1.16 (0.94 – 1.42)	1.10 (0.89 – 1.36)	1.09 (0.89 – 1.35)	1.18 (0.95 – 1.46)
High Iron	2.37 (1.47 – 3.81)	2.41 (1.48 – 3.94)	2.26 (1.38 – 3.70)	2.35 (1.44 – 3.85)	2.38 (1.46 – 3.90)
End Stage Renal Disease: 1041 events over median follow-up of 8.8 years					
Iron Replete	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	1.04 (0.86 – 1.25)	1.01 (0.83 – 1.23)	0.88 (0.72 – 1.07)	0.95 (0.78 – 1.15)	1.02 (0.83 – 1.24)
Functional Iron Deficiency	1.11 (0.93 – 1.31)	1.05 (0.89 – 1.25)	1.03 (0.87 – 1.23)	0.99 (0.83 – 1.18)	1.04 (0.88 – 1.24)

Group	Demographics Model HR (95% CI)	Full Model HR (95% CI)	Full Model + cFGF23 HR (95% CI)	Full Model + Hemoglobin HR (95% CI)	Full Model + PTH HR (95% CI)
High Iron	1.69 (1.13 – 2.53)	1.62 (1.06 – 2.45)	1.66 (1.09 – 2.53)	1.59 (1.04 – 2.42)	1.54 (1.01 – 2.34)
Atherosclerotic Cardiovascular Disease: 673 events over median follow-up of 8.8 years					
Iron Replete	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	1.08 (0.85 – 1.38)	0.99 (0.78 – 1.27)	0.89 (0.69 – 1.14)	0.93 (0.73 – 1.19)	0.998 (0.78 – 1.28)
Functional Iron Deficiency	1.19 (0.96 – 1.47)	1.12 (0.91 – 1.39)	1.13 (0.91 – 1.40)	1.09 (0.88 – 1.34)	1.16 (0.93 – 1.43)
High Iron	1.30 (0.72 – 2.34)	1.16 (0.63 –2.14)	1.17 (0.63 – 2.16)	1.14 (0.62 – 2.10)	1.17 (0.63 – 2.16)

Results are reported as hazard ratios compared to the referent group.

Demographics Model: Stratified by center, adjusted for age, sex, race, and ethnicity

Full Model: Demographics model plus diabetes, smoking, systolic blood pressure, body mass index, history of cardiovascular disease, estimated glomerular filtration rate, urinary albumin-to-creatinine ratio, and erythropoietin use

Abbreviations: HR, hazard ratio; CI, confidence interval; CRP, C-reactive protein

Supplemental Table 6. Iron groups and risks of mortality and cardiovascular events adjusting for UACR as a continuous variable

Group	Incidence Density (95% CI)	Demographics Model HR (95% CI)	Full Model HR (95% CI)	Full Model + oral iron use HR (95% CI)	Full Model + CRP HR (95% CI)	Full Model + Phosphate Binder Use HR (95% CI)
All-cause Mortality: 1104 events over median follow-up of 9.5 years						
Iron Replete	3.24 (2.88, 3.64)	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	3.65 (3.04, 4.35)	1.32 (1.07, 1.63)	1.28 (1.03, 1.58)	1.27 (1.03, 1.58)	1.23 (0.99, 1.53)	1.28 (1.03, 1.58)
Mixed Iron Deficiency	4.89 (3.95, 5.99)	1.48 (1.17, 1.87)	1.61 (1.27, 2.05)	1.62 (1.27, 2.06)	1.53 (1.20, 1.95)	1.62 (1.27, 2.06)
Functional Iron Deficiency	4.23 (3.46, 5.13)	1.19 (0.95, 1.49)	1.11 (0.88, 1.40)	1.11 (0.88, 1.40)	0.98 (0.77, 1.24)	1.11 (0.88, 1.40)
High Iron	4.30 (3.57, 5.13)	1.37 (1.11, 1.70)	1.53 (1.23, 1.90)	1.53 (1.23, 1.91)	1.55 (1.25, 1.93)	1.53 (1.23, 1.90)
Heart Failure: 728 events over median follow-up of 8.8 years						
Iron Replete	2.55 (2.20, 2.93)	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	3.45 (2.80, 4.20)	1.49 (1.17, 1.90)	1.34 (1.05, 1.72)	1.34 (1.05, 1.72)	1.33 (1.04, 1.71)	1.35 (1.05, 1.73)
Mixed Iron Deficiency	3.54 (2.68, 4.58)	1.28 (0.95, 1.73)	1.32 (0.97, 1.79)	1.32 (0.97, 1.79)	1.29 (0.96, 1.76)	1.33 (0.98, 1.80)
Functional Iron Deficiency	3.55 (2.77, 4.47)	1.23 (0.93, 1.61)	1.14 (0.87, 1.51)	1.14 (0.87, 1.51)	1.08 (0.81, 1.43)	1.15 (0.87, 1.52)
High Iron	3.32 (2.63, 4.12)	1.34 (1.03, 1.74)	1.45 (1.10, 1.91)	1.45 (1.10, 1.90)	1.46 (1.11, 1.92)	1.45 (1.10, 1.91)
End Stage Renal Disease: 1041 events over median follow-up of 8.8 years						
Iron Replete	3.98 (3.55, 4.46)	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	3.93	1.00	1.08	1.08	1.07	1.08

Group	Incidence Density (95% CI)	Demographics Model HR (95% CI)	Full Model HR (95% CI)	Full Model + oral iron use HR (95% CI)	Full Model + CRP HR (95% CI)	Full Model + Phosphate Binder Use HR (95% CI)
	(3.25, 4.72)	(0.81, 1.25)	(0.86, 1.35)	(0.86, 1.35)	(0.86, 1.35)	(0.86, 1.35)
Mixed Iron Deficiency	4.38 (3.42, 5.52)	1.03 (0.79, 1.33)	1.31 (1.01, 1.71)	1.32 (1.01, 1.72)	1.31 (1.01, 1.71)	1.31 (1.00, 1.71)
Functional Iron Deficiency	4.66 (3.77, 5.69)	0.97 (0.77, 1.23)	0.90 (0.71, 1.14)	0.90 (0.71, 1.14)	0.90 (0.71, 1.14)	0.90 (0.71, 1.14)
High Iron	4.65 (3.83, 5.61)	1.14 (0.91, 1.42)	1.15 (0.91, 1.46)	1.16 (0.92, 1.47)	1.15 (0.91, 1.46)	1.15 (0.91, 1.46)
Atherosclerotic Cardiovascular Disease: 673 events over median follow-up of 8.8 years						
Iron Replete	2.75 (2.39, 3.15)	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	2.42 (1.89, 3.05)	1.00 (0.76, 1.31)	0.94 (0.71, 1.23)	0.94 (0.71, 1.23)	0.92 (0.70, 1.21)	0.94 (0.71, 1.23)
Mixed Iron Deficiency	2.49 (1.79, 3.36)	0.88 (0.63, 1.23)	0.94 (0.67, 1.32)	0.94 (0.67, 1.32)	0.89 (0.63, 1.25)	0.94 (0.67, 1.31)
Functional Iron Deficiency	2.81 (2.14, 3.62)	0.94 (0.70, 1.26)	0.85 (0.63, 1.15)	0.85 (0.63, 1.15)	0.76 (0.56, 1.03)	0.85 (0.63, 1.15)
High Iron	2.76 (2.16, 3.49)	0.99 (0.75, 1.29)	1.01 (0.76, 1.34)	1.01 (0.76, 1.35)	1.02 (0.77, 1.36)	1.01 (0.76, 1.34)

Results are reported as hazard ratios compared to the referent group.

Demographics Model: Stratified by center, adjusted for age, sex, race, and ethnicity

Full Model: Demographics model plus diabetes, smoking, systolic blood pressure, body mass index, history of cardiovascular disease, estimated glomerular filtration rate, urinary albumin-to-creatinine ratio (continuous variable), and erythropoietin use

Abbreviations: HR, hazard ratio; CI, confidence interval; CRP, C-reactive protein

Supplemental Table 7. Iron groups and risks of mortality and cardiovascular events adjusting for UACR as a continuous variable and additionally adjusting for potential mediators: FGF23, hemoglobin and PTH

Group	Demographics Model HR (95% CI)	Full Model HR (95% CI)	Full Model + FGF23 HR (95% CI)	Full Model + hemoglobin HR (95% CI)	Full Model + PTH HR (95% CI)
All-cause Mortality: 1104 events over median follow-up of 9.5 years					
Iron Replete	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	1.32 (1.07, 1.63)	1.28 (1.03, 1.58)	0.98 (0.78, 1.22)	1.20 (0.96, 1.49)	1.25 (1.01, 1.55)
Mixed Iron Deficiency	1.48 (1.17, 1.87)	1.61 (1.27, 2.05)	1.42 (1.11, 1.82)	1.55 (1.22, 1.98)	1.62 (1.27, 2.07)
Functional Iron Deficiency	1.19 (0.95, 1.49)	1.11 (0.88, 1.40)	1.05 (0.83, 1.33)	1.07 (0.85, 1.36)	1.14 (0.90, 1.44)
High Iron	1.37 (1.11, 1.70)	1.53 (1.23, 1.90)	1.57 (1.26, 1.96)	1.50 (1.21, 1.87)	1.51 (1.21, 1.89)
Heart Failure: 728 events over median follow-up of 8.8 years					
Iron Replete	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	1.49 (1.17, 1.90)	1.34 (1.05, 1.72)	0.99 (0.76, 1.28)	1.25 (0.97, 1.60)	1.32 (1.03, 1.69)
Mixed Iron Deficiency	1.28 (0.95, 1.73)	1.32 (0.97, 1.79)	1.19 (0.88, 1.62)	1.27 (0.93, 1.72)	1.23 (0.90, 1.68)
Functional Iron Deficiency	1.23 (0.93, 1.61)	1.14 (0.87, 1.51)	1.10 (0.83, 1.46)	1.08 (0.82, 1.43)	1.18 (0.89, 1.56)
High Iron	1.34 (1.03, 1.74)	1.45 (1.10, 1.91)	1.47 (1.12, 1.94)	1.45 (1.10, 1.90)	1.43 (1.08, 1.88)
End Stage Renal Disease: 1041 events over median follow-up of 8.8 years					
Iron Replete	Reference	Reference	Reference	Reference	Reference

Group	Demographics Model HR (95% CI)	Full Model HR (95% CI)	Full Model + FGF23 HR (95% CI)	Full Model + hemoglobin HR (95% CI)	Full Model + PTH HR (95% CI)
Iron Deficiency	1.00 (0.81, 1.25)	1.08 (0.86, 1.35)	0.97 (0.77, 1.22)	1.003 (0.80, 1.26)	1.09 (0.87, 1.37)
Mixed Iron Deficiency	1.03 (0.79, 1.33)	1.31 (1.01, 1.71)	1.25 (0.95, 1.63)	1.25 (0.96, 1.64)	1.30 (0.99, 1.70)
Functional Iron Deficiency	0.97 (0.77, 1.23)	0.90 (0.71, 1.14)	0.90 (0.71, 1.15)	0.85 (0.67, 1.08)	0.91 (0.72, 1.16)
High Iron	1.14 (0.91, 1.42)	1.15 (0.91, 1.46)	1.24 (0.98, 1.57)	1.12 (0.89, 1.42)	1.13 (0.89, 1.44)
Atherosclerotic Cardiovascular Disease: 673 events over median follow-up of 8.8 years					
Iron Replete	Reference	Reference	Reference	Reference	Reference
Iron Deficiency	1.00 (0.76, 1.31)	0.94 (0.71, 1.23)	0.82 (0.61, 1.09)	0.87 (0.66, 1.15)	0.94 (0.71, 1.24)
Mixed Iron Deficiency	0.88 (0.63, 1.23)	0.94 (0.67, 1.32)	0.92 (0.65, 1.29)	0.91 (0.65, 1.28)	0.91 (0.65, 1.29)
Functional Iron Deficiency	0.94 (0.70, 1.26)	0.85 (0.63, 1.15)	0.85 (0.63, 1.15)	0.82 (0.60, 1.10)	0.89 (0.66, 1.20)
High Iron	0.99 (0.75, 1.29)	1.01 (0.76, 1.34)	1.03 (0.77, 1.37)	0.997 (0.75, 1.33)	0.97 (0.73, 1.30)

Results are reported as hazard ratios compared to the referent group.

Demographics Model: Stratified by center, adjusted for age, sex, race, and ethnicity

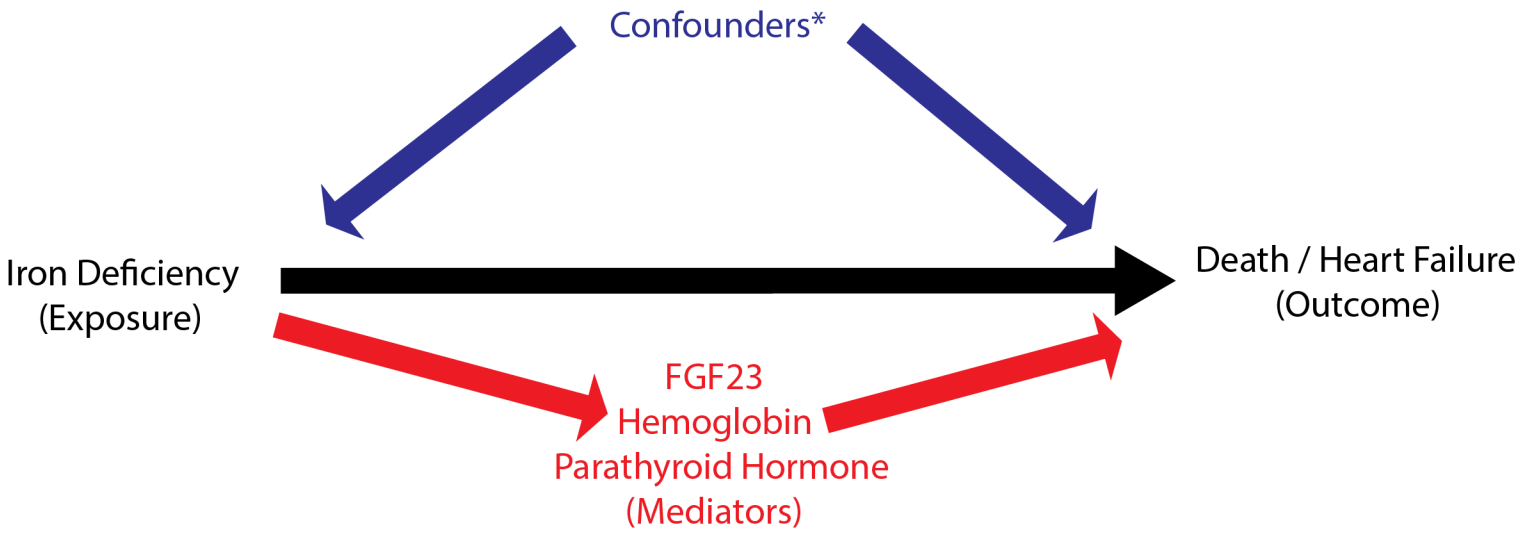
Full Model: Demographics model plus diabetes, smoking, systolic blood pressure, body mass index, history of cardiovascular disease, estimated glomerular filtration rate, urinary albumin-to-creatinine ratio (continuous variable), and erythropoietin use

Abbreviations: FGF23, fibroblast growth factor 23; PTH, parathyroid hormone; HR, hazard ratio; CI, confidence interval; CRP, C-reactive protein

Supplemental Figure 1. Classification of iron groups according clinical thresholds of ferritin and transferrin saturation

<table>
<tr><td></td><td colspan="3">TSAT %</td></tr>
<tr><td>Ferritin Cutoffs</td><td><=20</td><td>>20-40</td><td>>40</td></tr>
<tr><td><=100</td><td>Iron Deficiency
N=666</td><td colspan="2">Non-Classified (NC)
N=1173</td></tr>
<tr><td>>100-300</td><td rowspan="2">Functional Iron Deficiency
N=810</td><td>Iron Replete
N=1029</td><td>NC</td></tr>
<tr><td>>300</td><td>NC</td><td>High Iron
N=69</td></tr>
</table>

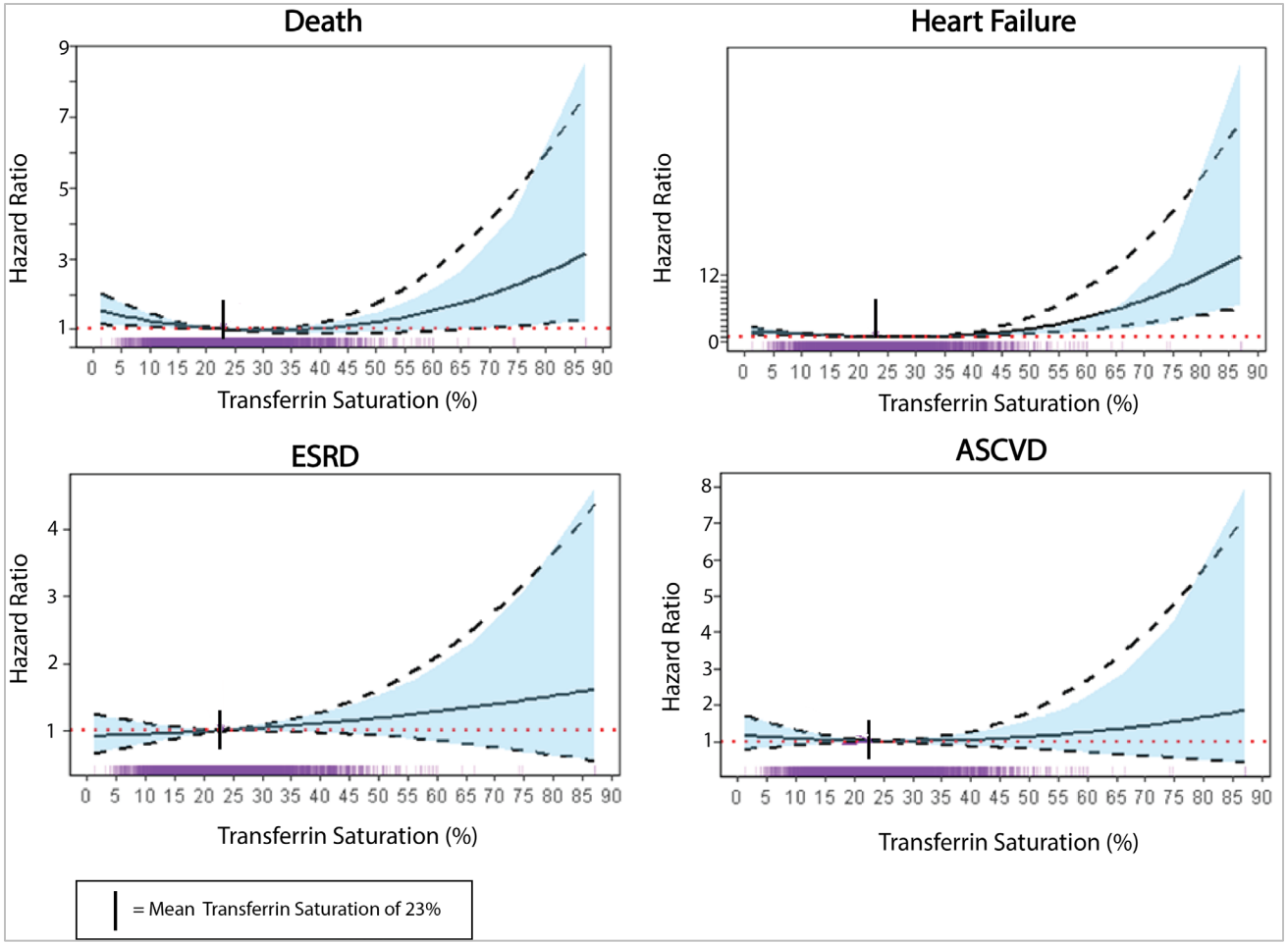
Supplemental Figure 2. Direct acyclic graph detailing exposure, confounders, mediators and outcomes



*center, age, sex, race, ethnicity, diabetes, smoking, systolic blood pressure, body mass index, history of cardiovascular disease, estimated glomerular filtration rate, urinary albumin-to-creatinine ratio, and erythropoeitin use

Supplemental Figure 3. Transferrin Saturation and mortality and cardiovascular events

Results reported as hazard ratios (95% confidence intervals) per 1-unit increase in transferrin saturation. Models stratified by center, adjusted for age, sex, race, ethnicity, diabetes, smoking, systolic blood pressure, body mass index, history of cardiovascular disease, estimated glomerular filtration rate, urinary albumin-to-creatinine ratio, and erythropoietin use.



Supplemental Figure 4. Ferritin and mortality and cardiovascular events

Results reported as hazard ratios (95% confidence intervals) per 1-SD increase in natural log ferritin. Models stratified by center, adjusted for age, sex, race, ethnicity, diabetes, smoking, systolic blood pressure, body mass index, history of cardiovascular disease, estimated glomerular filtration rate, urinary albumin-to-creatinine ratio, and erythropoietin use.