

SUPPLEMENTAL MATERIAL

Renal Dysfunction is Associated with Post-Stroke Discharge Disposition and In-Hospital Mortality: Findings from GWTG

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Table I. Hospital characteristics by eGFR level

Variable	Overall (N=232236)	GFR ≥ 60 (N=109913)	GFR 45-59 (N=61719)	GFR 30-44 (N =39201)	GFR 15-29 (N=131 18)	GFR < 15 (N =1700)	On Dialysis (N=6585)	P-Value
Region, %								<0.0001
Northeast	27.9	28.2	27.8	27.9	27.5	26.2	26.4	
Midwest	20.7	20.2	21.2	21.4	21.1	20.5	20.5	
South	36.8	36.4	36.9	37.0	37.9	37.4	39.4	
West	14.5	15.2	14.1	13.7	13.5	15.9	13.7	
Teaching Hospital, %	54.4	55.9	53.0	52.4	53.0	53.2	57.2	<0.0001
Number of beds, median (25 th -75 th P*)	342 (235-507)	348 (240-514)	338 (233-501)	333 (230-485)	337 (230- 493)	333 (231-504)	358 (252-542)	<0.0001
Rural Location, %	5.3	5.1	5.3	5.5	6.0	5.5	3.6	<0.0001
Primary stroke center status, %	50.0	49.9	50.6	49.7	49.6	50.7	49.8	0.0383
Annual volume of ischemic stroke admission median (25 th -75 th P)	206.0 (140.2- 301.9)	207.4 (141.1- 306.7)	204.7 (139.1- 301.9)	197.9 (137.9- 298.7)	202.4 (137.3- 300.2)	197.5 (132.4- 299.8)	212.0 (145.4- 315.4)	<0.0001
Annual volume of tPA administrations median (25 th -75 th P)	14.0 (8.1-24.0)	14.1 (8.4-24.4)	14.0 (8.1-23.9)	13.7 (7.8-23.8)	13.9 (7.8- 23.5)	14.3 (7.5-23.8)	14.8 (8.5-24.1)	<0.0001

*P: percentile

Table II. Association of demographic and clinical factors and in-hospital mortality or hospice for patients admitted with ischemic stroke by eGFR level

	Factor	Unadjusted OR, 95%CI	P- value	Interactio n P	Adjusted OR 95% CI	P- value	Interact ion P
Age	Overall interaction between age and eGFR level			<.0001			0.0056
	eGFR≥60: increase per 5 years	1.48(1.46, 1.50)	<.0001		1.30(1.27, 1.32)	<.0001	

	Factor	Unadjusted OR, 95%CI	P- value	Interactio n P	Adjusted OR 95% CI	P- value	Interact ion P
	eGFR 45-59: increase per 5 years	1.47(1.45, 1.50)	<.0001		1.29(1.26, 1.32)	<.0001	
	eGFR 30-44: increase per 5 years	1.40(1.37, 1.43)	<.0001		1.28(1.24, 1.32)	<.0001	
	eGFR 15-29: increase per 5 years	1.28(1.25, 1.32)	<.0001		1.21(1.16, 1.26)	<.0001	
	GFR<15: increase per 5 years	1.29(1.20, 1.38)	<.0001		1.29(1.14, 1.46)	<.0001	
	Dialysis: increase per 5 years	1.26(1.20, 1.32)	<.0001		1.16(1.08, 1.25)	<.0001	
Previous Stroke/TIA	Overall interaction between previous stroke/TIA and eGFR level			<.0001			0.0198
	eGFR \geq 60	1.13(1.08, 1.19)	<.0001		0.99(0.93, 1.05)	0.7681	
	eGFR 45-59	1.06(1.00, 1.12)	0.0380		1.00(0.92, 1.07)	0.8995	
	eGFR 30-44	0.98(0.93, 1.04)	0.5843		0.96(0.87, 1.05)	0.3565	
	eGFR 15-29	0.83(0.75, 0.91)	0.0001		0.81(0.70, 0.95)	0.0076	
	GFR<15	1.10(0.87, 1.39)	0.4093		0.93(0.60, 1.45)	0.7535	
	Dialysis	0.83(0.71, 0.97)	0.0196		0.69(0.54, 0.88)	0.0027	
Admission Systolic BP	Overall interaction between SBP and eGFR level			<.0001			0.0007
	eGFR \geq 60: Per 5 mmHg up to 150 mmHg	0.93(0.92, 0.94)	<.0001		0.95(0.94, 0.96)	<.0001	
	eGFR \geq 60: per 5 mmHg above 150 mmHg	1.01(1.01, 1.02)	<.0001		1.03(1.02, 1.03)	<.0001	
	eGFR 45-59: Per 5 mmHg up to 150 mmHg	0.95(0.94, 0.96)	<.0001		0.97(0.96, 0.98)	<.0001	
	eGFR 45-59: per 5 mmHg above 150 mmHg	1.02(1.01, 1.02)	<.0001		1.02(1.01, 1.03)	<.0001	
	eGFR 30-44: Per 5 mmHg up to 150 mmHg	0.94(0.93, 0.95)	<.0001		0.94(0.92, 0.95)	<.0001	
	eGFR 30-44: per 5 mmHg above 150 mmHg	1.02(1.02, 1.03)	<.0001		1.03(1.02, 1.04)	<.0001	
	eGFR 15-29: Per 5 mmHg up to 150 mmHg	0.94(0.93, 0.96)	<.0001		0.94(0.92, 0.96)	<.0001	
	eGFR 15-29: per 5 mmHg above 150 mmHg	1.00(0.99, 1.01)	0.9074		1.01(0.99, 1.03)	0.3438	
	GFR<15: Per 5 mmHg up to 150 mmHg	0.93(0.91, 0.96)	<.0001		0.93(0.88, 0.98)	0.0079	

	Factor	Unadjusted OR, 95%CI	P- value	Interactio n P	Adjusted OR 95% CI	P- value	Interact ion P
	GFR<15: per 5 mmHg above 150 mmHg	1.00(0.97, 1.03)	0.9622		1.00(0.94, 1.06)	0.9632	
	Dialysis: Per 5 mmHg up to 150 mmHg	0.92(0.90, 0.94)	<.0001		0.92(0.89, 0.95)	<.0001	
	Dialysis: per 5 mmHg above 150 mmHg	1.00(0.98, 1.02)	0.8439		1.01(0.98, 1.04)	0.4988	
Admission Glucose	Overall interaction between glucose and eGFR level			<.0001			0.0247
	eGFR≥60: per 5 mg/dL up to 100 mg/dL	1.00(0.98, 1.02)	0.7549		1.00(0.97, 1.03)	0.9903	
	eGFR≥60: per 5 mg/dL increase between 100 and 150 mg/dL	1.08(1.08, 1.09)	<.0001		1.06(1.05, 1.07)	<.0001	
	eGFR≥60: per 5 mg/dL above 150 mg/dL	0.99(0.98, 0.99)	<.0001		1.00(1.00, 1.01)	0.1503	
	eGFR 45-59: per 5 mg/dL up to 100 mg/dL	1.00(0.98, 1.03)	0.7928		1.01(0.97, 1.05)	0.5632	
	eGFR 45-59: per 5 mg/dL increase between 100 and 150 mg/dL	1.08(1.07, 1.09)	<.0001		1.05(1.04, 1.06)	<.0001	
	eGFR 45-59: per 5 mg/dL above 150 mg/dL	0.99(0.99, 1.00)	0.0002		1.01(1.00, 1.01)	0.0003	
	eGFR 30-44: per 5 mg/dL up to 100 mg/dL	1.01(0.98, 1.04)	0.4962		0.99(0.95, 1.03)	0.6256	
	eGFR 30-44: per 5 mg/dL increase between 100 and 150 mg/dL	1.07(1.06, 1.08)	<.0001		1.06(1.04, 1.07)	<.0001	
	eGFR 30-44: per 5 mg/dL above 150 mg/dL	1.00(0.99, 1.00)	0.0144		1.00(1.00, 1.01)	0.7784	
	eGFR 15-29: per 5 mg/dL up to 100 mg/dL	0.98(0.94, 1.01)	0.2286		0.94(0.89, 1.00)	0.0358	
	eGFR 15-29: per 5 mg/dL increase between 100 and 150 mg/dL	1.07(1.05, 1.08)	<.0001		1.06(1.04, 1.09)	<.0001	
	eGFR 15-29: per 5 mg/dL above 150 mg/dL	1.00(1.00, 1.00)	0.5707		1.01(1.00, 1.02)	0.0054	
	GFR<15: per 5 mg/dL up to 100 mg/dL	0.97(0.90, 1.04)	0.3517		0.98(0.86, 1.12)	0.7964	
	GFR<15: per 5 mg/dL increase between 100 and 150 mg/dL	1.08(1.04, 1.11)	<.0001		1.05(0.99, 1.11)	0.0782	

	Factor	Unadjusted OR, 95% CI	P- value	Interactio n P	Adjusted OR 95% CI	P- value	Interact ion P
	GFR<15: per 5 mg/dL above 150 mg/dL	1.00(1.00, 1.01)	0.2743		1.01(0.99, 1.02)	0.4510	
	Dialysis: per 5 mg/dL up to 100 mg/dL	0.96(0.92, 1.01)	0.0837		0.88(0.82, 0.94)	0.0003	
	Dialysis: per 5 mg/dL increase between 100 and 150 mg/dL	1.04(1.02, 1.07)	0.0003		1.06(1.02, 1.10)	0.0013	
	Dialysis: per 5 mg/dL above 150 mg/dL	0.99(0.99, 1.00)	0.0452		1.00(0.99, 1.01)	0.6715	
NIHSS Score	Overall interaction between NIHSS and eGFR level			<.0001			0.0008
	eGFR≥60: increase per 5 points	2.08(2.04, 2.11)	<.0001		1.99(1.96, 2.03)	<.0001	
	eGFR 45-59: increase per 5 points	2.03(1.99, 2.08)	<.0001		1.96(1.92, 2.01)	<.0001	
	eGFR 30-44: increase per 5 points	1.99(1.94, 2.04)	<.0001		1.94(1.89, 1.99)	<.0001	
	eGFR 15-29: increase per 5 points	1.86(1.80, 1.93)	<.0001		1.84(1.78, 1.91)	<.0001	
	GFR<15: increase per 5 points	1.72(1.57, 1.90)	<.0001		1.70(1.54, 1.87)	<.0001	
	Dialysis: increase per 5 points	1.91(1.80, 2.02)	<.0001		1.89(1.78, 2.01)	<.0001	
Hospital: Teaching vs. No Teaching	Overall interaction between teaching site and eGFR level			0.1292			0.0123
	eGFR≥60	1.09(1.03, 1.15)	0.0034		1.11(1.02, 1.20)	0.0117	
	eGFR 45-59	1.10(1.03, 1.18)	0.0027		1.00(0.92, 1.10)	0.9442	
	eGFR 30-44	1.14(1.06, 1.21)	0.0001		1.07(0.96, 1.18)	0.2136	
	eGFR 15-29	0.98(0.90, 1.07)	0.7099		0.93(0.80, 1.09)	0.3812	
	GFR<15	1.05(0.84, 1.31)	0.6611		0.96(0.65, 1.43)	0.8468	
	Dialysis	1.04 (0.89, 1.21)	0.6411		0.77(0.61, 0.97)	0.0265	

Table III. Association of demographic and clinical factors with discharge home for patients admitted with ischemic stroke by eGFR level

	Factor	Unadjusted OR 95% CI	P- value	Interacti on P	Adjusted OR 95% CI	P-value	Interaction P
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	Factor	Unadjusted OR 95% CI	P- value	Interacti on P	Adjusted OR 95% CI	P-value	Interaction P
Age	Overall interaction between age and eGFR level			<.0001			0.0013
	eGFR \geq 60: increase per 5 years	0.72 (0.71, 0.72)	<.0001		0.76 (0.75, 0.77)	<.0001	
	eGFR 45-59: increase per 5 years	0.71 (0.70, 0.72)	<.0001		0.75 (0.74, 0.76)	<.0001	
	eGFR 30-44: increase per 5 years	0.74 (0.73, 0.75)	<.0001		0.77 (0.76, 0.79)	<.0001	
	eGFR 15-29: increase per 5 years	0.77 (0.75, 0.78)	<.0001		0.79 (0.76, 0.82)	<.0001	
	eGFR<15: increase per 5 years	0.75 (0.70, 0.80)	<.0001		0.79 (0.71, 0.87)	<.0001	
	Dialysis: increase per 5 years	0.84 (0.81, 0.87)	<.0001		0.83 (0.79, 0.88)	<.0001	
Sex	Overall interaction between Sex and eGFR level			<.0001			0.0209
	eGFR \geq 60: Female vs. Male	0.70 (0.68, 0.72)	<.0001		0.85 (0.82, 0.88)	<.0001	
	eGFR 45-59: Female vs. Male	0.59 (0.57, 0.61)	<.0001		0.79 (0.75, 0.83)	<.0001	
	eGFR 30-44: Female vs. Male	0.74 (0.71, 0.78)	<.0001		0.88 (0.82, 0.94)	0.0001	
	eGFR 15-29: Female vs. Male	0.69 (0.64, 0.75)	<.0001		0.75 (0.67, 0.85)	<.0001	
	eGFR<15: Female vs. Male	0.73 (0.58, 0.93)	0.0089		0.87 (0.62, 1.22)	0.4201	
	Dialysis: Female vs. Male	0.77 (0.70, 0.85)	<.0001		0.94 (0.81, 1.10)	0.4701	
Race	Overall interaction between race and eGFR level			<.0001			<.0001
	eGFR \geq 60: Nonwhite vs. White	0.94 (0.91, 0.97)	0.0001		0.91 (0.87, 0.96)	0.0002	
	eGFR 45-59: Nonwhite vs. White	1.05 (1.01, 1.10)	0.0227		1.02 (0.95, 1.09)	0.5912	
	eGFR 30-44: Nonwhite vs. White	1.08 (1.02, 1.14)	0.0096		1.11 (1.01, 1.21)	0.0275	
	eGFR 15-29: Nonwhite vs. White	1.21 (1.11, 1.33)	<.0001		1.20 (1.03, 1.39)	0.0165	
	eGFR<15: Nonwhite vs. White	1.35 (1.05, 1.74)	0.0213		1.27 (0.86, 1.86)	0.2260	

	Factor	Unadjusted OR 95% CI	P- value	Interacti on P	Adjusted OR 95% CI	P-value	Interaction P
	Dialysis: Nonwhite vs. White	1.01 (0.92, 1.12)	0.8294		0.98 (0.84, 1.16)	0.8463	
Hypertension	Overall interaction between hypertension and eGFR level			<.0001			0.0387
	eGFR \geq 60	0.86 (0.84, 0.89)	<.0001		0.91 (0.87, 0.94)	<.0001	
	eGFR 45-59	0.96 (0.92, 1.00)	0.0392		0.92 (0.87, 0.98)	0.0109	
	eGFR 30-44	1.13 (1.06, 1.19)	<.0001		1.04 (0.95, 1.13)	0.4162	
	eGFR 15-29	1.19 (1.07, 1.33)	0.0021		1.05 (0.88, 1.24)	0.5803	
	eGFR<15	1.23 (0.90, 1.67)	0.1933		1.01 (0.65, 1.57)	0.9654	
	Dialysis	1.18 (1.01, 1.37)	0.0394		1.06 (0.84, 1.33)	0.6219	
Dyslipidemia	Overall interaction between dyslipidemia and eGFR level			0.0002			0.0066
	eGFR \geq 60	1.32 (1.29, 1.35)	<.0001		1.20 (1.16, 1.25)	<.0001	
	eGFR 45-59	1.35 (1.31, 1.40)	<.0001		1.15 (1.09, 1.20)	<.0001	
	eGFR 30-44	1.41 (1.35, 1.48)	<.0001		1.16 (1.08, 1.24)	<.0001	
	eGFR 15-29	1.32 (1.23, 1.43)	<.0001		1.04 (0.93, 1.17)	0.4755	
	eGFR<15	1.56 (1.24, 1.96)	0.0001		1.47 (1.03, 2.08)	0.0337	
	Dialysis	1.10 (1.00, 1.21)	0.0588		0.93 (0.80, 1.08)	0.3342	
NIHSS Score	Overall interaction between NIHSS and eGFR level			<.0001			0.0003
	eGFR \geq 60: increase per 5 points	0.41 (0.40, 0.42)	<.0001		0.42 (0.41, 0.43)	<.0001	
	eGFR 45-59: increase per 5 points	0.42 (0.41, 0.44)	<.0001		0.44 (0.42, 0.45)	<.0001	
	eGFR 30-44: increase per 5 points	0.43 (0.42, 0.45)	<.0001		0.44 (0.43, 0.46)	<.0001	
	eGFR 15-29: increase per 5 points	0.45 (0.42, 0.48)	<.0001		0.46 (0.43, 0.49)	<.0001	
	eGFR<15: increase per 5 ypoints	0.42 (0.34, 0.51)	<.0001		0.44 (0.36, 0.54)	<.0001	
	Dialysis: increase per 5 points	0.51 (0.46, 0.55)	<.0001		0.51 (0.47, 0.56)	<.0001	

	Factor	Unadjusted OR 95% CI	P- value	Interacti on P	Adjusted OR 95% CI	P-value	Interaction P
Independent Ambulatory Status at Admission	Overall interaction between independent ambulatory status and eGFR level			<.0001			0.0127
	eGFR \geq 60	6.70 (6.44, 6.97)	<.0001		3.33 (3.17, 3.51)	<.0001	
	eGFR 45-59	6.80 (6.49, 7.13)	<.0001		3.34 (3.15, 3.55)	<.0001	
	eGFR 30-44	6.27 (5.94, 6.63)	<.0001		3.08 (2.86, 3.32)	<.0001	
	eGFR 15-29	5.77 (5.23, 6.37)	<.0001		2.86 (2.50, 3.27)	<.0001	
	eGFR<15	6.88 (5.10, 9.27)	<.0001		4.30 (2.79, 6.61)	<.0001	
	Dialysis	4.97 (4.37, 5.66)	<.0001		2.66 (2.19, 3.23)	<.0001	