

A Machine Learning Approach to Predicting Readmission or Mortality in Patients Hospitalized for Stroke or Transient Ischemic Attack

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Supplemental Table

Table S1. Independent variables.

Variable	Total (n = 3422)	Readmission or Mortality Within 90 days (n = 602)	No Readmission or Mortality Within 90 days (n = 2820)	<i>p</i>
Age, years, mean (SD)	68.3 (12.6)	71.3 (12.3)	67.7 (12.6)	<0.001
Female, n (%)	1366 (39.9)	264 (43.9)	1102 (39.1)	0.030
Stroke type, n (%)				0.924
Ischemic stroke	2622 (76.6)	465 (77.2)	2157 (76.5)	
TIA	467 (13.7)	80 (13.3)	387 (13.7)	
ICH	333 (9.7)	57 (9.5)	276 (9.8)	
Pre-stroke mRS, median (IQR)	0 (0–1)	0 (0–2)	0 (0–1)	<0.001
NIHSS, median (IQR)	4 (2–9)	6 (3–14)	4 (2–8)	<0.001
Prior ED visits within one year, n (%)				<0.001
0	2,529 (73.9)	399 (66.3)	2130 (75.5)	
1	597 (17.5)	112 (18.6)	485 (17.2)	
≥2	296 (8.7)	91 (15.1)	205 (7.3)	
Prior hospitalization within one year, n (%)	495(14.5)	125(20.8)	370(13.1)	<0.001
Education, n (%)				<0.001
Illiterate	1058 (30.9)	234 (38.9)	824 (29.2)	
Elementary school	1254 (36.7)	204 (33.9)	1050 (37.2)	
Junior high school	398 (11.6)	70 (11.6)	328 (11.6)	
Senior high school	443 (13.0)	65 (10.8)	378 (13.4)	
College or university	251 (7.3)	27 (4.5)	224 (7.9)	
Graduate school	17 (0.5)	2 (0.3)	15 (0.5)	
Unknown	1 (0.0)	0 (0.0)	1 (0.0)	
Occupation, n (%)				<0.001
Jobless	1895 (55.4)	384 (63.8)	1511 (53.6)	
Military personnel	2 (0.1)	0 (0)	2 (0.1)	
Civil servant	42 (1.2)	4 (0.7)	38 (1.4)	
Teacher	18 (0.5)	1 (0.2)	17 (0.6)	
Labor	224 (6.6)	24 (4.0)	200 (7.1)	
Farmer	405 (11.8)	46 (7.6)	359 (12.7)	

Businessperson	193 (5.6)	31 (5.2)	162 (5.7)	
Service personnel	173 (5.1)	30 (5.0)	143 (5.1)	
Student	1 (0.0)	0 (0.0)	1 (0.0)	
Retired	393 (11.5)	72 (12.0)	321 (11.4)	
Others	76 (2.2)	10 (1.7)	66 (2.3)	
ED arrival mode, n (%)				<0.001
By oneself	75 (2.2)	4 (0.7)	71 (2.5)	
By private vehicle	2387 (69.8)	388 (64.5)	1999 (70.9)	
Transferred from other hospital	73 (2.1)	18 (3.0)	55 (2.0)	
By ambulance	720 (21.0)	167 (27.7)	553 (19.6)	
Transferred from OPD	167 (4.9)	25 (4.2)	142 (5.0)	
Cared by spouse, n (%)	1066 (31.2)	173 (28.7)	893 (31.7)	0.159
Cared by offspring, n (%)	1766 (51.6)	307 (51.0)	1459 (51.7)	0.741
Cared by spouse or offspring, n (%)	2583 (75.5)	439 (72.9)	2144 (76.0)	0.108
Cared by sibling, n (%)	73 (2.1)	10 (1.7)	63 (2.2)	0.377
Cared by relative, n (%)	152 (4.4)	21 (3.5)	131 (4.7)	0.211
Cared by friend, n (%)	45 (1.3)	7 (1.2)	38 (1.4)	0.718
Cared by attendant, n (%)	527 (15.4)	128 (21.3)	399 (14.2)	<0.001
Cared by oneself, n (%)	253 (7.4)	33 (5.5)	220 (7.8)	0.048
Cared by others, n (%)	189 (5.5)	32 (5.3)	157 (5.6)	0.806
BT group, n (%)				0.113
<35 °C	75 (2.2)	20 (3.3)	55 (2.0)	
35–37.5 °C	3230 (94.4)	562 (93.4)	2668 (94.6)	
>37.5 °C	117 (3.4)	20 (3.3)	97 (3.4)	
SBP group, n (%)				0.073
≤100 mmHg	31 (0.9)	7 (1.2)	24 (0.9)	
101–139 mmHg	647 (18.9)	122 (20.3)	525 (18.6)	
140–159 mmHg	973 (28.4)	186 (30.9)	787 (27.9)	
160–219 mmHg	1591 (46.5)	249 (41.4)	1342 (47.6)	
≥220 mmHg	179 (5.2)	38 (6.3)	141 (5.0)	
DBP group, n (%)				0.270
<50 mmHg	17 (0.5)	4 (0.7)	13 (0.5)	
50–89 mmHg	1666 (48.7)	313 (52.0)	1353 (48.0)	
90–99 mmHg	724 (21.2)	128 (21.3)	596 (21.1)	
100–119 mmHg	778 (22.7)	120 (19.9)	658 (23.3)	
≥120 mmHg	236 (6.9)	37 (6.2)	199 (7.1)	
HR group, n (%)				0.037
<45 bpm	8 (0.2)	1 (0.2)	7 (0.3)	
45–59 bpm	261 (7.6)	39 (6.5)	222 (7.9)	
60–99 bpm	2672 (78.1)	455 (75.6)	2217 (78.6)	
100–119 bpm	384 (11.2)	82 (13.6)	302 (10.7)	
≥120 bpm	97 (2.8)	25 (4.2)	72 (2.6)	
RR group, n (%)				0.134
≤15 bpm	2 (0.1)	1 (0.2)	1 (0.0)	
16–19 bpm	7 (0.2)	3 (0.5)	4 (0.1)	
20–26 bpm	1331 (38.9)	222 (36.9)	1109 (39.3)	
≥27 bpm	2080 (60.8)	375 (62.4)	1705 (60.5)	
BMI group, n (%)				<0.001
<18.5 kg/m ²	163 (4.8)	50 (8.3)	113 (4.0)	
18.5–23.9 kg/m ²	1336 (39.0)	287 (47.7)	1049 (37.2)	
24–26.9 kg/m ²	1036 (30.3)	140 (23.3)	896 (31.8)	
≥27 kg/m ²	887 (25.9)	125 (20.8)	762 (27.0)	
WHR group, n (%)				0.841
<0.86	262 (10.4)	47 (11.5)	215 (10.2)	
0.86–0.88	266 (10.6)	43 (10.5)	223 (10.6)	

0.89–0.91	343 (13.7)	59 (14.4)	284 (13.5)	
0.92–0.94	448 (17.8)	77 (18.8)	371 (17.7)	
0.95–0.97	412 (16.4)	60 (14.7)	352 (16.8)	
≥0.98	780 (31.1)	123 (30.1)	657 (31.3)	
GCS group, n (%)				<0.001
13–15	2,902 (84.8)	444 (73.8)	2458 (87.2)	
9–12	318 (9.3)	91 (15.1)	227 (8.1)	
≤8	202 (5.9)	67 (11.1)	135 (4.8)	
Glucose group, n (%)				0.186
<60 mg/dl	5 (0.2)	2 (0.4)	3 (0.1)	
60–139 mg/dl	1735 (53.7)	287 (50.1)	1448 (54.4)	
140–179 mg/dl	615 (19.0)	116 (20.2)	499 (18.8)	
180–300 mg/dl	658 (20.4)	131 (22.9)	527 (19.8)	
>300 mg/dl	220 (6.8)	37 (6.5)	183 (6.9)	
eCCr stage, n (%)				<0.001
Stage 1 = eCCr >90 cc/min	422 (12.4)	56 (9.4)	366 (13.0)	
Stage 2 = eCCr 60–89 cc/min	972 (28.6)	134 (22.6)	838 (29.8)	
Stage 3a = eCCr 45–59 cc/min	851 (25.0)	131 (22.1)	720 (25.6)	
Stage 3b = eCCr 30–44 cc/min	701 (20.6)	138 (23.2)	563 (20.1)	
Stage 4 = eCCr 15–29 cc/min	351 (10.3)	101 (17.0)	250 (8.9)	
Stage 5 = eCCr <15 cc/min	105 (3.1)	34 (5.7)	71 (2.5)	
ALT group, n (%)				0.026
≤44 U/L	2660 (85.7)	479 (86.6)	2181 (85.5)	
45–131 U/L	407 (13.1)	62 (11.2)	345 (13.5)	
≥132 U/L	37 (1.2)	12 (2.2)	25 (1.0)	
WBC group, n (%)				0.002
≤4 × 10 ³ /uL	80 (2.3)	18 (3.0)	62 (2.2)	
(4.1– 10) × 10 ³ /uL	2677 (78.2)	439 (72.9)	2238 (79.4)	
>10 × 10 ³ /uL	665 (19.4)	145 (24.1)	520 (18.4)	
Hemoglobin group, n (%)				<0.001
<12 g/dL	618 (18.1)	174 (28.9)	444 (15.8)	
12–13.9 g/dL	1193 (34.9)	196 (32.6)	997 (35.4)	
14–15.9 g/dL	1199 (35.1)	181 (30.1)	1018 (36.1)	
16–17.9 g/dL	367 (10.7)	46 (7.6)	321 (11.4)	
≥18 g/dL	44 (1.3)	5 (0.8)	39 (1.4)	
Hematocrit group, n (%)				<0.001
<30%	128 (3.7)	38 (6.3)	90 (3.2)	
30–35.9%	496 (14.5)	131 (21.8)	365 (13.0)	
36–46%	2308 (67.5)	365 (60.6)	1943 (69.0)	
>46%	486 (14.2)	68 (11.3)	418 (14.8)	
Platelet count group, n (%)				0.004
<100 × 10 ⁹ /L	85 (2.5)	25 (4.2)	60 (2.1)	
(100– 199) × 10 ⁹ /L	1587 (46.4)	276 (45.9)	1311 (46.5)	
(200– 299) × 10 ⁹ /L	1493 (43.6)	242 (40.2)	1251 (44.4)	
(300– 399) × 10 ⁹ /L	209 (6.1)	49 (8.1)	160 (5.7)	
≥400 × 10 ⁹ /L	47 (1.4)	10 (1.7)	37 (1.3)	
Albumin group, n (%)				<0.001
>3.5 g/dL	350 (68.5)	56 (52.8)	294 (72.6)	
2.8–3.5 g/dL	140 (27.4)	41 (38.7)	99 (24.4)	
<2.8 g/dL	21 (4.1)	9 (8.5)	12 (3.0)	
hcCRP group, n (%)				0.171
<1 mg/L	106 (14.7)	21 (10.9)	85 (16.0)	
1–3 mg/L	124 (17.2)	31 (16.2)	93 (17.6)	

>3 mg/L	492 (68.1)	140 (72.9)	352 (66.4)	
Failed dysphagia screening test, n (%)	448 (23.0)	143 (37.2)	305 (19.5)	<0.001
Use of nasogastric tube, n (%)	722 (21.1)	212 (35.2)	510 (18.1)	<0.001
Use of Foley catheter, n (%)	472 (13.8)	128 (21.3)	344 (12.2)	<0.001
Prior use of anticoagulant, n (%)	61 (1.8)	17 (2.8)	44 (1.6)	0.033
Prior use of antiplatelet, n (%)	676 (19.8)	148 (24.6)	528 (18.7)	0.001
Prior stroke or TIA, n (%)	823 (24.1)	171 (28.4)	652 (23.1)	0.006
Hypertension, n (%)	2769 (80.9)	495 (82.2)	2274 (80.6)	0.368
Diabetes mellitus, n (%)	1349 (39.4)	282 (46.8)	1067 (37.8)	<0.001
Hyperlipidemia, n (%)	1895 (55.4)	304 (50.5)	1591 (56.4)	0.008
ESRD, n (%)	80 (2.3)	27 (4.5)	53 (1.9)	<0.001
Atrial fibrillation, n (%)	457 (13.4)	119 (19.8)	338 (12.0)	<0.001
CAD, n (%)	410 (12.0)	105 (17.4)	305 (10.8)	<0.001
Heart failure, n (%)	128 (3.7)	42 (7.0)	86 (3.1)	<0.001
Sick sinus syndrome, n (%)	18 (0.5)	4 (0.7)	14 (0.5)	0.605
RHD, n (%)	15 (0.4)	6 (1.0)	9 (0.3)	0.022
Valvular replacement, n (%)	26 (0.8)	7 (1.2)	19 (0.7)	0.210
Mitral valve prolapse, n (%)	5 (0.2)	1 (0.2)	4 (0.1)	0.887
Endocarditis, n (%)	10 (0.3)	3 (0.5)	7 (0.3)	0.302
PAD, n (%)	26 (0.8)	7 (1.2)	19 (0.7)	0.210
Hyperuricemia, n (%)	592 (17.3)	122 (20.3)	470 (16.7)	0.034
Current smoker, n (%)	822 (24.0)	125 (20.8)	697 (24.7)	0.039
Former smoker, n (%)	562 (16.4)	122 (20.3)	440 (15.6)	0.005
Alcohol consumption, n (%)	257 (7.5)	34 (5.7)	223 (7.9)	0.056
Vegetarian, n (%)	94 (2.8)	15 (2.5)	79 (2.8)	0.673
Polycythemia, n (%)	8 (0.2)	1 (0.2)	7 (0.3)	0.705
Physical inactivity, n (%)	2646 (77.3)	492 (81.7)	2154 (76.4)	0.004
FH of stroke, n (%)	1143 (33.4)	173 (28.7)	970 (34.4)	0.008
Use of birth control pill, n (%)	13 (0.4)	1 (0.2)	12 (0.4)	0.348
Recent infection, n (%)	312 (9.1)	82 (13.6)	230 (8.2)	<0.001
Snoring, n (%)	1974 (57.7)	333 (55.3)	1641 (58.2)	0.195
Depression, n (%)	298 (8.7)	62 (10.3)	236 (8.4)	0.127
Cancer, n (%)	203 (5.9)	61 (10.1)	142 (5.0)	<0.001

ALT = alanine transaminase. BMI = body mass index. BT = body temperature. CAD = coronary artery disease. DBP = diastolic blood pressure. eCCr = estimated creatinine clearance rate. ED = emergency department. ESRD = end-stage renal disease. FH = family history. GCS = Glasgow Coma Scale. HR = heart rate. hsCRP = high-sensitivity C-reactive protein. ICH = intracerebral hemorrhage. IQR = interquartile range. mRS = modified Rankin Scale. NIHSS = National Institutes of Health Stroke Scale. OPD = outpatient department. PAD = peripheral artery disease. RHD = rheumatic heart disease. RR = respiratory rate. SBP = systolic blood pressure. SD = standard deviation. TIA = transient ischemic attack. WBC = white blood cell. WHR = waist-to-hip ratio.