# Supplementary Online Content

Shkirkova K, Saver JL, Starkman S, et al; FAST-MAG Trial Coordinators and Investigators. Frequency, predictors, and outcomes of prehospital and early postarrival neurological deterioration in acute stroke: an exploratory analysis of the FAST-MAG randomized clinical trial. *JAMA Neurol*. Published online July 23, 2018. doi:10.1001/jamaneurol.2018.1893

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This supplementary material has been provided by the authors to give readers additional information about their work.

**eTable 1.** Demographic and Clinical Characteristics of the Patients in the Secondary Analysis With Or Without GCS Available at Hospital Arrival

| Characteristic | Group with no available GCS on arrival n=733 | Group with available GCS on arrival n=965 | P value |
|---|---|---|---|
| Age (Mean, SD) | 69.8 (13.6) | 69.1 (13.5) | 0.32 |
| Sex Female (N, Percent) | 320 (43.7) | 405 (41.9) | 0.46 |
| Race, n (%) | | | |
| American Indian/Alaskan Native | 4 (0.5) | 5 (0.5) | 0.29 |
| Asian | 58 (7.9) | 81 (8.4) | 0.29 |
| Native Hawaiian/Pacific Islander | 1 (0.1) | 7 (0.7) | 0.29 |
| Black/African American | 104 (14.2) | 115 (11.9) | 0.29 |
| White | 566 (77.2) | 759 (78.5) | 0.29 |
| Ethnicity – Hispanic, n (%) | 171 (23.3) | 231 (23.9) | 0.79 |
| Prestroke Modified Rankin Scale, | 0 (0-0) | 0 (0-0) | 0.26 |
| Prehospital LAMS, median (IQR) | 4.0 (3.0-5.0) | 4.0 (3.0-5.0) | 0.59 |
| Prehospital GCS, median (IQR) | 15.0 (14.0-15.0) | 15.0 (15.0-15.0) | 0.09 |
| Early ED course LAMS, median (IQR) | 3.0 (2.0-5.0) | 3.0 (3.0-5.0) | 0.56 |
| Early ED course GCS, median (IQR) | 15.0 (14.0-15.0) | 15.0 (15.0-15.0) | 0.66 |
| Early ED course NIHSS, median (IQR) | 900 (3.0-17.5) | 9.0 (3.0-18.0) | 0.74 |
| Final Diagnosis, n (%) | | | |
| Cerebral Ischemia | 532 (72.6) | 713 (73.7) | 0.66 |
| Intracranial Hemorrhage | 174 (23.7) | 213 (22.0) | 0.66 |
| Stroke-mimicking condition | 27 (3.7) | 40 (4.1) | 0.66 |
| Medical History | | | |
| Hypertension, n (%) | 581 (79.3) | 738 (76.3) | 0.15 |
| Diabetes, n (%) | 158 (21.6) | 219 (22.6) | 0.59 |
| Hyperlipidemia, n (%) | 344 (46.9) | 461 (47.7) | 0.76 |
| Atrial fibrillation, n (%) | 159 (21.7) | 210 (2.7) | 0.99 |
| Tobacco use, n (%) | 112 (15.3) | 185 (19.1) | 0.38 |
| Coronary artery disease, n (%) | 143 (19.5) | 210 (21.7) | 0.26 |
| Myocardial Infarction, n (%) | 75 (10.2) | 101 (10.4) | 0.89 |
| CABG/Coronary Stent, n (%) | 19 (2.6) | 30 (3.1) | 0.53 |
| Valvular Heart Disease, n (%) | 43 (5.9) | 87 (9.0) | 0.16 |
| Prior Ischemic Stroke, n (%) | 53 (7.2) | 58 (6.0) | 0.31 |
| Prior TIA , n (%) | 69 (9.4) | 88 (9.1) | 0.83 |
| Prior Intracerebral hemorrhage, n (%) | 4 (1.5) | 12 (1.2) | 0.65 |
| Prior Stroke of Unknown Etiology, n (%) | 67 (9.1) | 76 (7.9) | 0.35 |
| Any alcohol use, n (%) | 301 (41.1) | 353 (36.5) | 0.56 |
| Minutes onset to Paramedic Evaluation, median (IQR) | 24.0 (15.0-45.0) | 22.0 (14.0-40.0) | 0.02 |

| | | | |
|---|---|---|---|
| Minutes onset to ED Arrival, median (IQR) | 60.0 (47.0-80.0) | 56.0 (44.0-75.0) | <0.001 |
| Minutes ED to nurse GCS, median (IQR) | 84.0 (62.0-109.0) | 81.0 (62.0-106.0) | 0.48 |

**eTable 2.** Patterns of Ultra-Early Neurologic Deterioration Among Patients With GCS Assessments Prehospital, on ED Arrival, and in the Early ED Course; Grouped by Ultra-Early Time Segment in Which U-END Occurred

| Patterns* | All Patients n=965 | Acute Cerebral Ischemia n=713 | Intracranial Hemorrhage n=210 | P value ACI vs ICH |
|---|---|---|---|---|
| Any U-END, n (%) | 205 (21.2) | 128 (18.0) | 82 (39.0) | <0.001 |
| Only Prehospital U-END | | | | |
| Prehospital Sustained | 30 (3.1) | 16 (2.2) | 13 (6.2) | 0.007 |
| Dipper | 63 (6.5) | 48 (6.7) | 14 (6.7) | 0.54 |
| Only Early ED U-END, n (%) | | | | |
| Peaker | 34 (3.5) | 30 (4.2) | 4 (1.9) | 0.08 |
| Delayed | 49 (5.1) | 22 (3.1) | 26 (12.4) | <0.001 |
| Continuous U-END, n (%) | | | | |
| Continuous Major | 23 (2.4) | 1 (0.1) | 22 (10.5) | <0.001 |
| Continuous Minor | 4 (0.4) | 1 (0.1) | 3 (1.4) | <0.001 |
| No U-END | 762 (78.8) | 595 (83.5) | 128 (61.0) | <0.001 |

*Prehospital Sustained – prehospital deterioration, then stable early ED phase
Dippers – prehospital deterioration, then early ED improvement
Peakers – prehospital improvement, then early ED deterioration
Delayed – stable prehospital, then ED deterioration
Continuous Major – prehospital deterioration and early ED deterioration.
Continues Minor – mild (1 point) GCS worsenings in both prehospital early ED phases, cumulatively reaching threshold for deterioration

**eTable 3.** Patterns of Ultra-Early Neurologic Deterioration Among Patients With GCS Assessments Prehospital, on ED Arrival, and in the Early ED Course; Grouped by Occurrence or Non-Occurrence of Net Deterioration

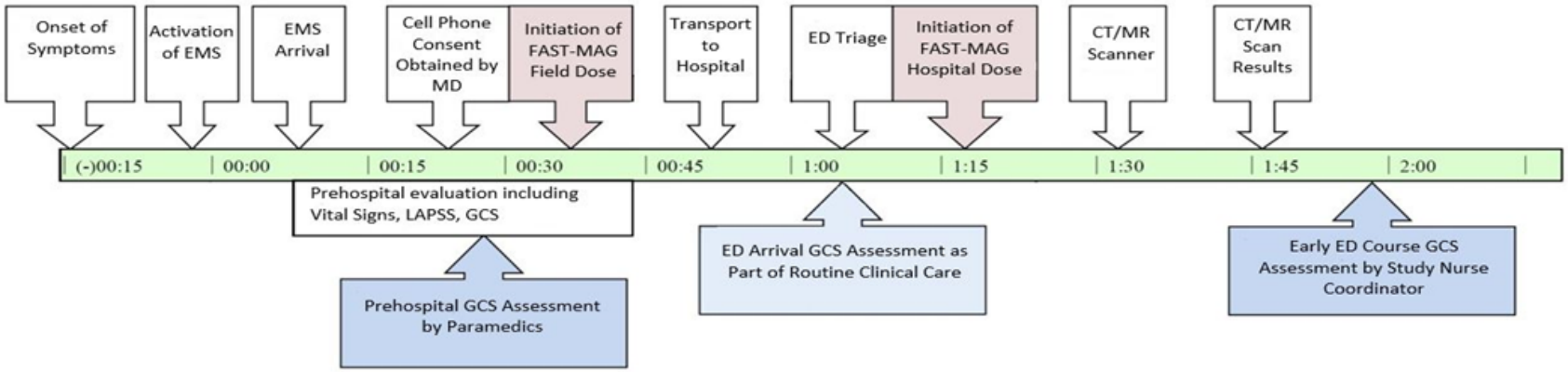
| Patterns* | All Patients n=965 | Acute Cerebral Ischemia n=713 | Intracranial Hemorrhage n=210 | P value ACI vs ICH |
|---|---|---|---|---|
| Any U-END, n (%) | 205 (21.2) | 128 (18.0) | 82 (39.0) | <0.001 |
| Net U-END, n (%) | | | | |
| Prehospital Sustained | 30 (3.1) | 16 (2.2) | 13 (6.2) | 0.007 |
| Delayed | 49 (5.1) | 22 (3.1) | 26 (12.4) | <0.001 |
| Continuous Major | 23 (2.4) | 1 (0.1) | 22 (10.5) | <0.001 |
| Continuous Minor | 4 (0.4) | 1 (0.1) | 3 (1.4) | <0.001 |
| Fluctuating U-END | | | | |
| Dipper | 63 (6.5) | 48 (6.7) | 14 (6.7) | 0.54 |
| Peaker | 34 (3.5) | 30 (4.2) | 4 (1.9) | 0.08 |
| No U-END | 762 (78.8) | 595 (83.5) | 128 (61.0) | <0.001 |

Prehospital Sustained – prehospital deterioration, then stable early ED phase
Delayed – stable prehospital, then ED deterioration
Continuous Major – prehospital deterioration and early ED deterioration.
Continues Minor – mild (1 point) GCS worsenings in both prehospital early ED phases, cumulatively reaching threshold for deterioration
Dippers – prehospital deterioration, then early ED improvement
Peakers – prehospital improvement, then early ED deterioration

**eTable 4.** ED Arrival GCS and Additional Baseline Variables Not Associated With U-END in All, Cerebral Ischemia, and Intracranial Hemorrhage Patients

| | All patients (n=1690) | | | CI patients (n=1237) | | | ICH patients (n=386) | | |
|---|---|---|---|---|---|---|---|---|---|
| | U-END (n=200) | No U-END (n=1490) | P | U-END (n=75) | No U-END (n=1162) | P | U-END (n=119) | No U-END (n=267) | P |
| Coronary Artery Disease, n (%) | 44 (21.8) | 309 (20.6) | 0.7 | 21 (28.0) | 273 (23.5) | 0.37 | 22 (18.5) | 25 (9.4) | 0.01 |
| Myocardial Infarction, n (%) | 26 (12.9) | 150 (10.0) | 0.21 | 14 (18.7) | 135 (11.6) | 0.07 | 11 (9.2) | 10 (3.7) | 0.03 |
| CABG/Coronary Stent, n (%) | 4 (2.0) | 45 (3.0) | 0.41 | 3 (4.0) | 39 (3.4) | 0.77 | 1 (0.8) | 4 (1.5) | 0.6 |
| Valvular Heart Disease, n (%) | 8 (4.0) | 122 (8.1) | 0.04 | 5 (6.7) | 114 (9.8) | 0.37 | 2 (1.7) | 8 (3.0) | 0.45 |
| ED arrival GCS, median (IQR) | | | | | | | | | |
| Median (IQR) | 12.0 (9.0-15.0) | 15.0 (14.0-15.0) | <0.001 | 11.0 (9.0-14.5) | 15.0 (14.0-15.0) | <0.001 | 12.0 (9.0-15.0) | 15.0 (14.0-15.0) | <0.001 |
| Mean (SD) | 11.3 (3.4) | 14.2 (1.8) | <0.001 | 11.4 (3.3) | 14.1 (1.9) | <0.001 | 11.3 (3.3) | 14.4 (1.5) | <0.001 |
| Prestroke Modified Rankin Scale, median (IQR) | 0.0 (0.0-0.0) | 0.0 (0.0-0.0) | 0.14 | 0.0 (0.0-0.0) | 0.0 (0.0-0.0) | 0.72 | 0.0 (0.0-0.0) | 0.0 (0.0-0.0) | 0.86 |
| Antiplatelet prior to onset, n(%) | - | - | - | - | - | - | 37 (30.8) | 62 (23.2) | 0.13 |
| Anticoagulant prior to onset, n(%) | - | - | - | - | - | - | 8 (6.7) | 18 (6.7) | 1 |

**eFigure.** Timeline Delineating Typical FAST-MAG Patient Enrollment and Assessment Activities During the First 2 Hours After Symptom Onset




Blue boxes indicate timing of serial Glasgow Coma Scale assessments in the ultra-early window; rose boxes indicate timing of initiation of FAST-MAG bolus and maintenance study agent infusions. (Abbreviations: FAST-MAG: The Field Administration of Stroke Therapy-Magnesium clinical trial; LAPSS: Los Angeles Prehospital Stroke Screen; GCS: Glasgow Coma Scale)