

Supplementary Data:**Table S1.** Patient demographics and clinical characteristics

| Cohort | <i>Prospective (Phase 2)</i> <i>(n= 15)</i> | <i>Retrospective</i> <i>(Phase 1)</i> <i>(n= 8)</i> | <i>Overall</i> <i>(n=23)</i> |
|--------------------------------------|--|--|---|
| Age (years) | | | |
| 0-2 | 6 | 4 | 10 |
| >2-5 | 2 | 2 | 4 |
| >5-13 | 4 | 2 | 6 |
| >13 | 3 | 0 | 3 |
| Sex | | | |
| male | 10 | 4 | 14 |
| female | 5 | 4 | 9 |
| Admitting Diagnosis | | | |
| Neurological disorder | 12 | 5 | 17 |
| Seizure disorders | 10 | 3 | 13 |
| Hydrocephalus | 0 | 1 | 1 |
| Brain tumors | 1 | 0 | 1 |
| Altered mental status/Motor tics | 1 | 1 | 2 |
| Respiratory insufficiency/failure | 2 | 2 | 2 |
| Cardiac condition | 1 | 1 | 4 |

| | | | |
|--|------------------|-----------------|------------------|
| Delirium diagnosis (ever; total $n=17$) | 9 | 8 | 17 |
| Number of delirium assessments per subject (median; IQR) | 3 (1.5-5) | 3 (2.75-3.25) | 3 (2-4) |
| Delirium occurrences ($n=72$) | 29 ($n=54$) | 9 ($n=18$) | 38 ($n=72$) |

Supplementary Table S2. Comparison of maximal delta-to-alpha ratios in 12-hour episodes with and without delirium in each cohort and overall sample. *Controlled for within-subject correlation.

| | Delta-to-Alpha ratio | <i>No delirium</i> | | Delirium | | <i>p value</i> | Odds Ratios* | Confidence Interval | <i>p value</i> |
|-----------------------|----------------------|--------------------|--------------------|-----------------|--------------------|----------------|---------------------|----------------------------|----------------|
| | | Mean | Standard Deviation | Mean | Standard Deviation | | | | |
| | | (<i>n=34</i>) | | (<i>n=38</i>) | | | | | |
| Full Cohort | <i>Frontal</i> | 1.46 | 0.42 | 1.71 | 0.40 | 0.013 | 4.85 | 0.92-25.56 | 0.063 |
| | <i>Parietal</i> | 1.48 | 0.42 | 1.74 | 0.40 | 0.010 | 5.47 | 1.01-29.67 | 0.049 |
| | <i>Occipital</i> | 1.48 | 0.42 | 1.75 | 0.40 | 0.008 | 5.94 | 1.07-33.04 | 0.042 |
| | <i>Temporal</i> | 1.48 | 0.41 | 1.73 | 0.39 | 0.010 | 5.88 | 1.02-33.94 | 0.048 |
| | <i>Global</i> | 1.50 | 0.42 | 1.74 | 0.42 | 0.017 | 3.94 | 0.81-19.07 | 0.089 |
| | | (<i>n=8</i>) | | (<i>n=10</i>) | | | | | |
| Phase 1 Cohort | <i>Frontal</i> | 1.67 | 0.35 | 1.90 | 0.53 | 0.292 | 3.94 | 0.19-82.75 | 0.377 |
| | <i>Parietal</i> | 1.69 | 0.34 | 1.93 | 0.52 | 0.258 | 4.49 | 0.20-102.53 | 0.346 |
| | <i>Occipital</i> | 1.70 | 0.35 | 1.94 | 0.50 | 0.242 | 5.16 | 0.18-150.74 | 0.341 |
| | <i>Temporal</i> | 1.68 | 0.33 | 1.90 | 0.50 | 0.282 | 4.51 | 0.17-122.99 | 0.371 |

| | | | | | | | | | |
|---------------------------|------------------|--------|------|--------|------|-------|------|------------|-------|
| | Global | 1.78 | 0.37 | 1.93 | 0.51 | 0.492 | 2.05 | 0.12-34.43 | 0.617 |
| | | (n=26) | | (n=28) | | | | | |
| Phase 2 Cohort | Frontal | 1.39 | 0.43 | 1.64 | 0.32 | 0.023 | 5.56 | 0.69-44.69 | 0.107 |
| | Parietal | 1.42 | 0.42 | 1.67 | 0.33 | 0.02 | 6.32 | 0.78-50.86 | 0.083 |
| | Occipital | 1.42 | 0.42 | 1.68 | 0.34 | 0.017 | 6.85 | 0.84-55.74 | 0.072 |
| | Temporal | 1.42 | 0.42 | 1.67 | 0.33 | 0.018 | 6.91 | 0.82-58.23 | 0.076 |
| | Global | 1.42 | 0.40 | 1.68 | 0.38 | 0.017 | 5.52 | 0.78-39.04 | 0.087 |

Supplementary Figure S1. Correlations between maximal DAR and CAP-D scores in each cohort and overall sample.

