Supplemental Online Content

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eTable 1. Comparison of Patients Who Consented for Follow-Up vs Those Who Did Not

eTable 2. Comparison of Patients with Complete Data vs Those Who Were Lost to Observational Follow-Up

eTable 3. Event Characteristics by Sex

eTable 4. Event Characteristics by Age

eTable 5. Acute Injury Severity Surrogates

eTable 6. Sex and History of Emotional Distress Interaction

eTable 7. Sex and History of Migraine Interaction

This supplemental material has been provided by the authors to give readers additional information about their work.
**eTable 1.** Comparison of Patients Who Consented for Follow-Up vs Those Who Did Not

| Eligibility and consent status                                      | Waiver of consent (N = 228) | Consented (N = 372) | P-value   |
|---------------------------------------------------------------------|-----------------------------|---------------------|-----------|
| **Age at injury**                                                   |                             |                     |           |
| 5 - 12 years old                                                    | 57 (25.0%)                  | 108 (29.0%)         | 0.301¹    |
| 13 - 18 years old                                                   | 171 (75.0%)                 | 264 (71.0%)         |           |
| **Sex**                                                             |                             |                     |           |
| Male                                                                | 116 (50.9%)                 | 160 (43.0%)         | 0.064¹    |
| Female                                                              | 112 (49.1%)                 | 212 (57.0%)         |           |
| **Total number of comorbidities (excluding seizures)**              |                             |                     | 0.586²    |
| 0                                                                   | 51 (22.4%)                  | 84 (22.6%)          |           |
| 1                                                                   | 76 (33.3%)                  | 122 (32.8%)         |           |
| 2                                                                   | 25 (11.0%)                  | 45 (12.1%)          |           |
| 3 or more                                                           | 23 (10.1%)                  | 45 (12.1%)          |           |
| Unknown                                                             | 53 (23.2%)                  | 76 (20.4%)          |           |

¹ Fisher's exact test.
² Kruskal-Wallis test.
**eTable 2. Comparison of Patients with Complete Data vs Those Who Were Lost to Observational Follow-Up**

| Respond | No (N = 73) | Yes (N = 271) | P-value |
|---------|-------------|---------------|---------|
| **Age at injury** | | | |
| 5 - 12 years old | 16 (21.9%) | 80 (29.5%) | 0.240¹ |
| 13 - 18 years old | 57 (78.1%) | 191 (70.5%) | |
| **Sex** | | | 0.894¹ |
| Male | 30 (41.1%) | 116 (42.8%) | |
| Female | 43 (58.9%) | 155 (57.2%) | |
| **Total number of comorbidities (excluding seizures)** | | | 0.008² |
| 0 | 8 (11.0%) | 71 (26.2%) | |
| 1 | 21 (28.8%) | 90 (33.2%) | |
| 2 | 13 (17.8%) | 30 (11.1%) | |
| 3 or more | 10 (13.7%) | 31 (11.4%) | |
| Unknown | 21 (28.8%) | 49 (18.1%) | |

¹ Fisher's exact test.  
² Kruskal-Wallis test.
### Table 3. Event Characteristics by Sex

| Event Characteristics                                                                 | Male (N = 276) | Female (N = 324) | Overall (N = 600) | P-value |
|---------------------------------------------------------------------------------------|----------------|-------------------|-------------------|---------|
| **Time to initial clinic visit (days)**                                               |                |                   |                   | 0.876¹  |
| N                                                                                    | 276            | 324               | 600               |         |
| Median [Q1, Q3]                                                                      | 16.5 [8.5,29.0] | 16.0 [8.0,29.0]   | 16.0 [8.0,29.0]   |         |
| **Definite reported mechanism of injury**                                            |                |                   |                   | 0.517²  |
| Yes (There was a discrete event with force to the head or rapid head movement without impact) | 271 (98.2%)    | 315 (97.2%)       | 586 (97.7%)       |         |
| No (There was no discrete event)                                                     | 3 (1.1%)       | 6 (1.9%)          | 9 (1.5%)          |         |
| Unknown                                                                              | 2 (0.7%)       | 3 (0.9%)          | 5 (0.8%)          |         |
| **Gradual recovery of symptoms over the first week of the injury**                   |                |                   |                   | 0.001²  |
| Yes (There have been improving symptoms over the first week)                         | 164 (59.4%)    | 142 (43.8%)       | 306 (51.0%)       |         |
| Yes (There have been stable symptoms over the first week)                            | 88 (31.9%)     | 143 (44.1%)       | 231 (38.5%)       |         |
| No (There have been worsening symptoms over the first week)                          | 21 (7.6%)      | 32 (9.9%)         | 53 (8.8%)         |         |
| Unknown                                                                              | 3 (1.1%)       | 7 (2.2%)          | 10 (1.7%)         |         |
| **Alternative explanation for the acute onset of symptoms**                          |                |                   |                   | 0.766²  |
| Yes (acute alternative conditions: migraine, cervical injury, heatstroke, syncope, panic attack, intercurrent illness, etc) | 20 (7.2%)      | 30 (9.3%)         | 50 (8.3%)         |         |
| No (concussion is the only likely cause for the acute onset of symptoms)             | 241 (87.3%)    | 278 (85.8%)       | 519 (86.5%)       |         |
| Unknown                                                                              | 2 (0.7%)       | 4 (1.2%)          | 6 (1.0%)          |         |
| **Mechanism/cause of injury**                                                        |                |                   |                   | 0.366²  |
| Motor vehicle crash (MVC)                                                             | 11 (4.0%)      | 17 (5.2%)         | 28 (4.7%)         |         |
| Assault                                                                              | 6 (2.2%)       | 6 (1.9%)          | 12 (2.0%)         |         |
| Struck by or against object/person (non-assault, non-sport)                          | 20 (7.2%)      | 35 (10.8%)        | 55 (9.2%)         |         |
| Fall (non-sport)                                                                     | 26 (9.4%)      | 21 (6.5%)         | 47 (7.8%)         |         |
| Sport/Recreation                                                                     | 210 (76.1%)    | 242 (74.7%)       | 452 (75.3%)       |         |
| Unknown                                                                              | 3 (1.1%)       | 3 (0.9%)          | 6 (1.0%)          |         |
| **Retrograde Amnesia**                                                               |                |                   |                   | 0.390²  |
| 39 (14.1%)                                                                           | 40 (12.3%)     | 79 (13.2%)        |                 |         |
| **Anterograde Amnesia**                                                              | 61 (22.1%)     | 55 (17.0%)        | 116 (19.3%)       | 0.091²  |

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| Loss of consciousness | Male (N = 276) | Female (N = 324) | Overall (N = 600) | P-value |
|-----------------------|----------------|-----------------|-------------------|---------|
|                       | 39 (14.1%)     | 30 (9.3%)       | 69 (11.5%)        | 0.052²  |

¹ Wilcoxon rank-sum test.
² Fisher's exact test.
### eTable 4. Event Characteristics by Age

| Event Characteristic                              | 5 - 12 years old (N = 165) | 13 - 18 years old (N = 435) | Overall (N = 600) | P-value |
|--------------------------------------------------|----------------------------|-----------------------------|-------------------|---------|
| **Time to initial clinic visit (days)**           |                            |                             |                   | 0.736¹  |
| N                                                | 165                        | 435                         | 600               |         |
| **Median [Q1, Q3]**                              | 17.0 [9.0,29.0]            | 16.0 [8.0,29.0]             | 16.0 [8.0,29.0]   |         |
| **Definite reported mechanism of injury**         |                            |                             |                   | 1.000²  |
| Yes (There was a discrete event with force to the head or rapid head movement without impact) | 162 (98.2%) | 424 (97.5%) | 586 (97.7%) |         |
| No (There was no discrete event)                  | 2 (1.2%)                   | 7 (1.6%)                    | 9 (1.5%)          |         |
| Unknown                                          | 1 (0.6%)                   | 4 (0.9%)                    | 5 (0.8%)          |         |
| **Gradual recovery of symptoms over the first week of the injury** | | | | 0.467² |
| Yes (There have been improving symptoms over the first week) | 90 (54.5%) | 216 (49.7%) | 306 (51.0%) |         |
| Yes (There have been stable symptoms over the first week) | 57 (34.5%) | 174 (40.0%) | 231 (38.5%) |         |
| No (There have been worsening symptoms over the first week) | 14 (8.5%) | 39 (9.0%) | 53 (8.8%) |         |
| Unknown                                          | 4 (2.4%)                   | 6 (1.4%)                    | 10 (1.7%)         |         |
| **Alternative explanation for the acute onset of symptoms** | | | | 0.537² |
| Yes (acute alternative conditions: migraine, cervical injury, heatstroke, syncope, panic attack, intercurrent illness, etc) | 14 (8.5%) | 36 (8.3%) | 50 (8.3%) |         |
| No (concussion is the only likely cause for the acute onset of symptoms) | 145 (87.9%) | 374 (86.0%) | 519 (86.5%) |         |
| Unknown                                          | 2 (1.2%)                   | 4 (0.9%)                    | 6 (1.0%)          |         |
| **Mechanism/cause of injury**                     |                            |                             |                   | <.001²  |
| Motor vehicle crash (MVC)                        | 8 (4.8%)                   | 20 (4.6%)                   | 28 (4.7%)         |         |
| Assault                                          | 4 (2.4%)                   | 8 (1.8%)                    | 12 (2.0%)         |         |
| Struck by or against object/person (non-assault, non-sport) | 25 (15.2%) | 30 (6.9%) | 55 (9.2%) |         |
| Fall (non-sport)                                 | 26 (15.8%)                 | 21 (4.8%)                   | 47 (7.8%)         |         |
| Sport/Recreation                                 | 100 (60.6%)                | 352 (80.9%)                 | 452 (75.3%)       |         |
| Unknown                                          | 2 (1.2%)                   | 4 (0.9%)                    | 6 (1.0%)          |         |
| **Retrograde Amnesia**                           | 17 (10.3%)                 | 62 (14.3%)                  | 79 (13.2%)        | 0.483²  |
| **Anterograde Amnesia**                          | 35 (21.2%)                 | 81 (18.6%)                  | 116 (19.3%)       | 0.187²  |

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| Age Category                     | 5 - 12 years old (N = 165) | 13 - 18 years old (N = 435) | Overall (N = 600) | P-value |
|---------------------------------|-----------------------------|------------------------------|--------------------|---------|
| Loss of consciousness          | 23 (13.9%)                  | 46 (10.6%)                   | 69 (11.5%)         | 0.142\(^2\) |

\(^1\) Wilcoxon rank-sum test.
\(^2\) Fisher's exact test.
**eTable 5. Acute Injury Severity Surrogates**

| Imaging done     | Overall (N = 600) |
|------------------|-------------------|
| CT and MRI       | 9 (1.5%)          |
| CT               | 105 (17.5%)       |
| MRI              | 14 (2.3%)         |
| Unknown          | 35 (5.8%)         |
| None             | 434 (72.3%)       |
| Unknown          | 3 (0.5%)          |

**Findings of the CT** (N=114)

| Findings          | Count (Percentage) |
|-------------------|--------------------|
| Normal            | 92 (80.7%)         |
| Abnormal          | 18 (15.8%)         |
| Unknown           | 4 (3.5%)           |

**Findings of the MRI** (N=23)

| Findings          | Count (Percentage) |
|-------------------|--------------------|
| Normal            | 18 (78.3%)         |
| Abnormal          | 5 (21.7%)          |

**Retrograde Amnesia**

| Status            | Count (Percentage) |
|-------------------|--------------------|
| No                | 444 (74.0%)        |
| Yes               | 79 (13.2%)         |
| Unknown           | 77 (12.8%)         |

**Length of retrograde amnesia** (N=79)

| Duration          | Count (Percentage) |
|-------------------|--------------------|
| ≤ 1 minute        | 8 (10.1%)          |
| > 1 minute - 20 minutes | 4 (5.1%)       |
| > 20 minutes - 1 hour | 9 (11.4%)       |
| > 1 hour - 24 hours | 11 (13.9%)       |
| > 1 day - 7 days  | 8 (10.1%)          |
| More than 7 days  | 12 (15.2%)         |
| Unknown           | 27 (34.2%)         |

**Anterograde Amnesia**

| Status            | Count (Percentage) |
|-------------------|--------------------|
| No                | 410 (68.3%)        |
| Yes               | 116 (19.3%)        |
| Unknown           | 74 (12.3%)         |

**Length of anterograde amnesia** (N=116)
| Length of LOC          | Overall (N = 600) |
|-----------------------|-------------------|
| ≤ 1 minute            | 8 (6.9%)          |
| > 1 minute - 20 minutes| 18 (15.5%)        |
| > 20 minutes - 1 hour | 16 (13.8%)        |
| > 1 hour - 24 hours   | 18 (15.5%)        |
| > 1 day - 7 days      | 12 (10.3%)        |
| More than 7 days      | 10 (8.6%)         |
| Unknown               | 34 (29.3%)        |

**Loss of consciousness (LOC)**

| LOC      |  |
|----------|---|
| No       | 472 (78.7%) |
| Yes      | 69 (11.5%)  |
| Unknown  | 59 (9.8%)   |

**Length of LOC (N=69)**

| Length of LOC       |       |
|---------------------|-------|
| Less than 1 minute  | 38 (55.1%) |
| Between 1-5 minutes | 14 (20.3%)  |
| Greater than 5 minutes | 5 (7.2%) |
| Unknown             | 12 (17.4%) |

CT: computerized tomography; MRI: magnetic resonance imaging
## eTable 6. Sex and History of Emotional Distress Interaction

| Obs | Parameter                          | ClassVal0 | ClassVal1 | DF | Estimate | StdErr | ChiSq  | ProbChiSq | HazardRatio | Label                                      |
|-----|------------------------------------|------------|------------|----|----------|--------|--------|-----------|-------------|--------------------------------------------|
| 1   | Gender                             | Female     | 1          | -0.12998 | 0.22861 | 0.3233 | 0.5697 | Gender Female |
| 2   | History of Emotional Distress      | No         | 1          | 0.34848 | 0.20439 | 2.9070 | 0.0882 | Mental Distress No |
| 3   | Gender*History of Emotional Distress | Female No | 1          | -0.05769 | 0.25940 | 0.0495 | 0.8240 | Gender Female * Mental Distress No |
eTable 7. Sex and History of Migraine Interaction

| Obs | Parameter            | ClassVal0 | ClassVal1 | DF | Estimate | StdErr | ChiSq | ProbChiSq | HazardRatio | Label                      |
|-----|----------------------|-----------|-----------|----|----------|--------|-------|-----------|-------------|---------------------------|
| 1   | Gender               | Female    |           | 1  | -0.42414 | 0.3022 | 1.969 | 0.1606    |             | Gender Female             |
| 2   | HistoryMigraines     | No        |           | 1  | 0.33680  | 0.2573 | 1.712 | 0.1907    |             | Migraines No              |
| 3   | Gender*HistoryMigraines | Female    | No        | 1  | 0.21084  | 0.3238 | 0.423 | 0.5150    |             | Gender Female * Migraines No |