**Case-Study 11: Traumatic Brain Injury**

* **Overview**: This dataset contains demographic, clinical and cognitive variables in a cohort of traumatic brain injury (TBI) patients.
* **Driving Challenges**: List a set of 3-5 questions that have clear healthcare applications that might be addressed, or at least examined by, using the dataset.
	+ Is worst.GCS (worst Glasgow Coma Scale Score) significantly correlated with 6m.gose (GCS at 6 month follow-up)?
	+ Are different mechanisms of injury significantly correlated with higher or lower GCS scores?
	+ Are GCS scores significantly correlated with seizures at any time (ever.sz)?
* **Meta-data**: Define all data elements, describe the dataset
	+ This dataset contains data for 46 patients who sustained a traumatic brain injury (TBI). The dataset includes variables related to demographics (such as age and gender) as well as variables related to the Glasgow Coma Scale. The Glasgow Coma Scale has scores ranging from 3-15, with 3 indicating the most severe injury possible and 15 indicating minor to no injury. There are three subscales of the Glasgow Coma Scale, pertaining to eye opening, verbal response, and motor response.
	+ The variables in the table include:
		- id=participant ID;
		- age=age;
		- sex=gender;
		- mechanism=type of TBI injury;
		- field.gcs=field [Glasgow Coma Scale](http://en.wikipedia.org/wiki/Glasgow_Coma_Scale);
		- er.gcs=emergency room [Glasgow Coma Scale](http://en.wikipedia.org/wiki/Glasgow_Coma_Scale);
		- icu.gcs=intensive care unit [Glasgow Coma Scale](http://en.wikipedia.org/wiki/Glasgow_Coma_Scale);
		- worst.gcs=lowest [Glasgow Coma Scale](http://en.wikipedia.org/wiki/Glasgow_Coma_Scale);
		- 6m.gose=[Extended Glasgow Outcome Scale](http://tbims.org/combi/gose/) score at 6-month follow up; 2013.gose=[Extended Glasgow Outcome Scale](http://tbims.org/combi/gose/) score in 2013;
		- skull.fx=skull fracture criterion for impact-induced head injury;
		- temp.injury=injury characteristic;
		- surgery=index of surgery;
		- spikes.hr=EEG spikes per hour;
		- min.hr=min EEG per hour;
		- max.hr=max EEG spikes per hour;
		- acute.sz=indicator of seizure at acute state;
		- late.sz=indicator of seizure at chronic state;
		- ever.sz=indicator of seizures at any time.
		- Period, **"."**, indicates missing data.
* **Data**: Include the complete dataset. It could be observational, derived, or simulated data. It should be somewhat interesting (e.g., include at least 5 variables, one or more time-points and represent 30 + cases/subjects/instances, hopefully, hundreds of cases)
	+ http://wiki.socr.umich.edu/index.php/SMHS\_MissingData#Example

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **id** | **age** | **sex** | **mechanism** | **field.gcs** | **er.gcs** | **icu.gcs** | **worst.gcs** | **6m.gose** | **2013.gose** | **skull.fx** | **temp.injury** | **surgery** | **spikes.hr** | **min.hr** | **max.hr** | **acute.sz** | **late.sz** | **ever.sz** |
| 1 | 19 | Male | Fall | 10 | 10 | 10 | 10 | 5 | 5 | 0 | 1 | 1 | . | . | . | 1 | 1 | 1 |
| 2 | 55 | Male | Blunt | . | 3 | 3 | 3 | 5 | 7 | 1 | 1 | 1 | 168.74 | 14 | 757 | 0 | 1 | 1 |
| 3 | 24 | Male | Fall | 12 | 12 | 8 | 8 | 7 | 7 | 1 | 0 | 0 | 37.37 | 0 | 351 | 0 | 0 | 0 |
| 4 | 57 | Female | Fall | 4 | 4 | 6 | 4 | 3 | 3 | 1 | 1 | 1 | 4.35 | 0 | 59 | 0 | 0 | 0 |
| 5 | 54 | Female | Peds\_vs\_Auto | 14 | 11 | 8 | 8 | 5 | 7 | 0 | 1 | 1 | 54.59 | 0 | 284 | 0 | 0 | 0 |
| 6 | 16 | Female | MVA | 13 | 7 | 7 | 7 | 7 | 8 | 1 | 1 | 1 | 75.92 | 7 | 180 | 0 | 1 | 1 |
| 7 | 21 | Male | Fall | 3 | 3 | 6 | 3 | 3 | 3 | 1 | 0 | 1 | . | . | . | 0 | 0 | 0 |
| 8 | 25 | Male | Fall | 3 | 4 | 3 | 3 | 3 | 3 | 0 | 1 | 0 | 5.26 | 0 | 88 | 0 | 1 | 1 |
| 9 | 30 | Male | GSW | 3 | 9 | 3 | 3 | 3 | 5 | 1 | 1 | 1 | 43.88 | 0 | 367 | 0 | 1 | 1 |
| 10 | 38 | Male | Fall | 3 | 6 | 6 | 3 | 3 | 3 | 1 | 1 | 1 | 45.6 | 4 | 107 | 0 | 1 | 1 |
| 11 | 43 | Male | Blunt | 8 | 7 | 7 | 7 | 6 | 7 | 1 | 0 | 1 | 7.76 | 0 | 72 | 0 | 0 | 0 |
| 12 | 40 | Male | Fall | 12 | 14 | 14 | 12 | 7 | 8 | 0 | 1 | 1 | 26.64 | 0 | 125 | 0 | 0 | 0 |
| 13 | 21 | Male | MVA | 12 | 13 | 9 | 9 | 7 | 7 | 1 | 0 | 1 | . | . | . | 0 | 1 | 1 |
| 14 | 35 | Female | MVA | 6 | 5 | 6 | 5 | 5 | 7 | 1 | 1 | 0 | 65.14 | 0 | 655 | 1 | 1 | 1 |
| 15 | 59 | Male | Peds\_vs\_Auto | 14 | 14 | 0 | 0 | 8 | 8 | 1 | 1 | 0 | . | . | . | 0 | 0 | 0 |
| 16 | 32 | Male | MCA | 5 | 6 | 3 | 3 | 4 | 5 | 1 | 0 | 0 | . | . | . | 0 | 0 | 0 |
| 17 | 31 | Male | MVA | 7 | 3 | 9 | 3 | 5 | 7 | 1 | 0 | 0 | 3.82 | 0 | 28 | 0 | 0 | 0 |
| 18 | 57 | Male | MVA | 4 | 3 | 7 | 3 | 3 | 3 | 0 | 1 | 1 | . | . | . | 0 | 1 | 1 |
| 19 | 18 | Male | Blunt | 4 | 3 | 6 | 3 | 5 | 3 | 1 | 1 | 1 | . | . | . | 0 | 1 | 1 |
| 20 | 48 | Male | Bike\_vs\_Auto | 3 | 8 | 7 | 3 | 5 | 7 | 0 | 0 | 0 | . | . | . | 0 | 0 | 0 |
| 21 | 19 | Male | GSW | 15 | 15 | 3 | 3 | . | 6 | 1 | 0 | 1 | . | . | . | 1 | 1 | 1 |
| 22 | 22 | Male | Fall | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 9.7 | 0 | 80 | 0 | 1 | 1 |
| 23 | 20 | Male | Peds\_vs\_Auto | 15 | 14 | 13 | 13 | 5 | 8 | 1 | 1 | 1 | . | . | . | 0 | 1 | 1 |
| 24 | 41 | Male | MVA | 3 | 3 | 6 | 3 | 3 | 7 | 1 | 0 | 0 | . | . | . | 0 | 0 | 0 |
| 25 | 27 | Male | MCA | 15 | 13 | 6 | 6 | 6 | 7 | 1 | 0 | 1 | . | . | . | 0 | 0 | 0 |
| 26 | 23 | Male | MVA | 14 | 14 | 7 | 7 | 4 | 7 | 1 | 1 | 1 | . | . | . | 0 | 0 | 0 |
| 27 | 36 | Male | MCA | 3 | 3 | 3 | 3 | 5 | 6 | 0 | 0 | 0 | . | . | . | 0 | 1 | 1 |
| 28 | 83 | Female | Fall | 14 | 14 | 9 | 9 | . | 5 | 0 | 1 | 1 | 208.92 | 42 | 641 | 1 | 1 | 1 |
| 29 | 26 | Male | MCA | 5 | 7 | 5 | 5 | 6 | 7 | 0 | 1 | 0 | . | . | . | 0 | 0 | 0 |
| 30 | 21 | Male | Fall | 14 | 14 | 14 | 14 | 5 | 7 | 0 | 1 | 1 | 294 | 30 | 1199 | 1 | 1 | 1 |
| 31 | 23 | Male | MCA | 12 | 13 | 13 | 12 | . | 7 | 1 | 0 | 1 | . | . | . | 0 | 0 | 0 |
| 32 | 45 | Male | MCA | 6 | 6 | 6 | 6 | 3 | 6 | 0 | 0 | 1 | . | . | . | 0 | 0 | 0 |
| 33 | 18 | Male | Bike\_vs\_Auto | 8 | 8 | 7 | 7 | 7 | 7 | 0 | 0 | 0 | 7.14 | 0 | 20 | 0 | 1 | 1 |
| 34 | 34 | Male | MVA | 7 | 7 | 3 | 3 | 4 | 6 | 0 | 1 | 1 | 47.73 | 0 | 226 | 0 | 1 | 1 |
| 35 | 19 | Male | MVA | 3 | 7 | 7 | 3 | 7 | 8 | 0 | 0 | 0 | 97.43 | 0 | 300 | 0 | 0 | 0 |
| 36 | 77 | Female | Peds\_vs\_Auto | 3 | 6 | 3 | 3 | 3 | 3 | 1 | 1 | 0 | 7.09 | 0 | 31 | 0 | 1 | 1 |
| 37 | 75 | Male | Bike\_vs\_Auto | . | . | . | . | . | 8 | 1 | 0 | 0 | 5.9 | 0 | 42 | 0 | 1 | 1 |
| 38 | 25 | Male | Fall | 14 | . | 6 | 6 | 8 | 8 | 0 | 0 | 1 | 29.61 | 0 | 175 | 1 | 0 | 1 |
| 39 | 62 | Female | Fall | 12 | 8 | 8 | 8 | 3 | 3 | 0 | 1 | 1 | 6.16 | 0 | 33 | 0 | 1 | 1 |
| 40 | 41 | Male | MCA | 7 | 3 | 7 | 3 | 5 | 5 | 1 | 1 | 1 | 1.66 | 0 | 23 | 0 | 1 | 1 |
| 41 | 60 | Male | Bike\_vs\_Auto | 3 | 12 | 7 | 3 | 3 | 5 | 1 | 1 | 0 | 3.8 | 0 | 12 | 0 | 1 | 1 |
| 42 | 29 | Female | Peds\_vs\_Auto | 9 | 14 | 3 | 3 | 8 | 7 | 1 | 0 | 1 | . | . | . | 0 | 1 | 1 |
| 43 | 48 | Male | Blunt | 12 | 12 | 11 | 11 | 6 | 7 | 0 | 0 | 1 | 5.39 | 0 | 43 | 0 | 0 | 0 |
| 44 | 41 | Male | Peds\_vs\_Auto | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 0 | 1.28 | 0 | 15 | 1 | 1 | 1 |
| 45 | 34 | Male | Fall | 6 | 8 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 213.84 | 3 | 824 | 1 | 1 | 1 |
| 46 | 25 | Female | MVA | 6 | 8 | 3 | 3 | . | 7 | 0 | 1 | 0 | 1.7 | 0 | 36 | 0 | 0 | 0 |

* **Provenance**:
	+ These data include information on Heart Attack Patients discharged from all of the hospitals in New York State in 199. No further provenance was provided on the webpage.