**Table 1.**

*Variable table showing the data layer, symbol, description, and type of all variables in the model*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variables |  | | Description | Type | |
| Data Layer | |  |  | |  |
| Response | | *Y* | 1 if the patient in month j died within 90 days post TBI; 0 otherwise | | Binary |
| Age | | *a* | Patient’s age at the time of injury | | Categorical (2) |
| Sex | | *s* | Patient’s sex. Female or male | | Binary |
| Stay Length | | *t* | Time span from moment of arrival to moment of departure (hours) | | Continuous |
| Manner of Arrival | | *h* | How the patient arrived at the care facility (e.g., ambulance, walk-in) | | Categorical (3) |
| Care Pathway | | *c* | Initial care setting post-injury (ER, ICU, hospital admission, Unknown) | | Categorical (4) |
| Month-year | | *my* | Combined categorical variable indicating the month and year of the TBI event | | Categorical (168) |
| Postal Code | | *pc* | Postal code of the patient's residence, indicating geographic location within capital area | | Categorical (20) |
| Latent Layer | |  |  | |  |
| Postal Code | | *μpc* | Unobserved random effects associated with different postal codes, which might influence the model outcomes | |  |
| Month Year | | *μmy* | Captures latent temporal effects specific to each month and year combination | |  |
| Hyperparameter Layer | |  |  | |  |
| Postal code | | *τpc* | Controls the degree of shrinkage or regularization applied to the postal code random effects | |  |
| Month-year | | *τmc* | Manages the variance of month-year random effects | |  |
| Note: Sex consists of Male and Female due to the lack of data for other genders. | | | | | |

**Table 2.**

*Descriptive statistics mortality by demographic variables, GCS missingness, the manner of arrival to the ED, length of stay based on care pathway (ER, Hospital Admission, and ICU)*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Overall | | Emergency Room | | Hospital Admission | | | ICU | | P-values |
|  | 0 | 1 | 0 | 1 | 0 | 1 | | 0 | 1 |  |
| Demographic  Age |  |  |  |  |  | |  |  |  |  |
| 18-65 | 3477 | 30 | 301 | 1 | 184 | | 1 | 15 | 0 | 0.91 |
| 65+ | 849 | 83 | 63 | 7 | 93 | | 5 | 7 | 0 | 0.35 |
| Sex |  |  |  |  |  | |  |  |  |  |
| Female | 2068 | 38 | 177 | 3 | 134 | | 4 | 2 | 0 | 0.74 |
| Male | 2258 | 75 | 187 | 5 | 143 | | 2 | 20 | 0 | 0.59 |
| GCS Missing |  |  |  |  |  | |  |  |  |  |
| Available | 211 | 3 | 21 | 1 | 17 | | 0 | 1 | 0 | 0.66 |
| Not Available | 4115 | 110 | 343 | 7 | 260 | | 6 | 21 | 0 | 0.78 |
| Manner of Arrival |  |  |  |  |  | |  |  |  |  |
| Ambulance service | 1603 | 104 | 162 | 6 | 133 | | 4 | 9 | 0 | 0.82 |
| Family | 901 | 2 | 62 | 0 | 50 | | 1 | 8 | 0 | 0.56 |
| Other | 1822 | 7 | 140 | 2 | 94 | | 1 | 5 | 0 | 0.94 |
| Note: p-values determining if there is a significant association between row parameters and mortality across different care pathways | | | | | | | | | | |

**Table 3**

*Table of Priors used for the Bayesian Hierarchical Model Construction implemented in RJAGS*

|  |  |  |
| --- | --- | --- |
| Prior Distribution | Parameter | Description |
| α ~ Ν(-3.9, 0.01) | α | Prior for the intercept |
| βa[1] = 0  βs[1] = 0  βh[1] = 0  βc[1] = 0  βg[1] = 0 | βa[1]  βs[1]  βh[1]  βc[1]  βg[2] | Coefficient for all reference categories set to 0 |
| βa[2] = t(1.91, 0.47, 3) | βa[2] | Coefficient for age group “65; 3 df for moderately heavy tails |
| βa[2] = t(0.68, 0.43, 3) | βs[2] | Coefficient for males |
| βh[2] = t(-2.93, 1.44, 3) | βh[2] | Coefficient for arrival by family |
| βh[3]= t(-2.27, 0.80, 3) | βh[3] | Coefficient for other types of arrival |
| βc[2] = t(-0.66, 0.64, 3) | βc[2] | Coefficient for hospital admission |
| βc[3] = t(-16.96, 4803.20, 3) | βc[3] | Coefficient for ICU, reflecting high variance and a very negative effect |
| βc[4] = t(0, 1, 7) | βc[4] | Coefficient for care pathway not reported, with thicker tailed student-t |
| βg[1] = t(0.44, 1.23, 3) | βg[1] | Coefficient for available GCS score |
| βt ~ Ν(0, 0.01) | βt | Coefficient for length of stay, with a normal distribution centered at 0 |
| μpostal ~ Ν(0, *τ*pc) | μpostal | Random effects for postal codes |  |
| μmonthyear ~ Ν(μmy [l-1], *τ*my) | μmonthyear | AR(1) process for month |
| *τ*postal ~ gamma(0.01, 0.01) | *τ*postal | Hyperparameter for postal code |
| *τ*monthyear~ gamma(0.01, 0.01) | *τ*monthyear | Hyperparameter for monthyear |
| Notes: Student t-distributions have 3 parameters (mean, scale, df); Gamma distribution (mean, precision); Normal distribution (mean, precision) | | |

Table 4

*Table of Predictors, Odds Ratios, Confidence Intervals, and P-values for the Generalized Linear Model*

A table of numbers with numbers

Description automatically generated with medium confidence