

# Cerebral state index versus glasgow coma scale as a predictor for in-hospital mortality in brain-injured ICU patients

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**Background:** Cerebral State Index (CSI) is derived from electroencephalogram (EEG) and is used for monitoring the level of consciousness during anesthesia. This study was designed to investigate the accuracy of Glasgow Coma Scale (GCS) and CSI as a predictor of in-hospital mortality in patients with trauma brain injury (TBI).

**Objective:** To compare the predictive value of GCS and CSI for predicting hospital discharge status of acute brain-injured patients.

**Methods:** In 60 brain-injured patients who did not receive sedatives, GCS and CSI were measured daily during the first 10 days of hospitalization. The outcome prognostic cut-off points were calculated for GCS and CSI using a receiver operating characteristic (ROC) curve regarding time of admission and third day of hospitalization. Sensitivity, specificity, and other predictive values for the two indices were calculated.

**Results:** Sixty patients were assessed; 14 patients were mild, 13 patients were moderate, and 33 patients were severe. During the course of the study, 17 patients (28.3%) deteriorated and died. The mean GCS and CSI in patients who died during hospitalization was significantly lower than for patients discharged from the hospital. For the first day, the area under the ROC curve was 0.947 in the GCS group. The best cut-off point in each scoring system was determined by the Youden index. The best cut-off point for GCS was 4.5 with sensitivity and specificity of 95.3 and 82.4, respectively. Similarly, for the CSI, the area under the ROC curve was 0.732; the best cut-off point for CSI was 64.5 with sensitivity and specificity of 88.4 and 64.7, respectively.

**Conclusion:** The GCS score at ICU admission is a good predictor of in-hospital mortality.  $GCS < 4.5$  and  $CSI < 64.5$  at the time of admission was associated with higher mortality risk in TBI patients. GCS is more sensitive than CSI in predicting death.

**Keywords:** Traumatic brain injury, Glasgow Coma Scale score, cerebral state index, outcome assessment