

Category : **Brain: Neurologic disease**

A247 - Exposure to non-lung protective mechanical ventilation is associated with outcome in critically ill patients with acute brain injury

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Introduction:

Patients with acute brain injury (ABI) commonly receive mechanical ventilation (MV) which can be harmful due to lung injury and adverse physiological effects on the brain. Our aim was to explore relationships between MV and outcome of patients with ABI. We hypothesize that MV variables are important determinants of short-term ABI outcomes.

Methods:

Adult patients with traumatic brain injury (TBI) or stroke who received MV as part of their care in the ICU were selected from large multicenter database (eICU). A set of features was crafted based on current recommendations for lung-protective MV and included time “out-of-range” (OOR) for: tidal volume per ideal body weight (>8 ml/kg), plateau pressure (>30 cmH₂O), PEEP (<5 cmH₂O). Outcomes were defined as “Unfavorable” for patients who died or whose discharge motor Glasgow Coma Score (mGCS) was < 5, and “Favorable” for patients who were alive and had a mGCS ≥5 at discharge. Two models were created: (1) A clinical model which uses only the first value recorded for each feature; and (2) A combined model which included predefined OOR MV variables.

Results:

Data were analyzed on 839 and 1,221 ICU stays for TBI and stroke, respectively. Clinical and combined models had an AUROC of 0.67 ± 0.07 and 0.79 ± 0.13 for Stroke and an AUROC of 0.70 ± 0.07 and 0.81 ± 0.07 respectively for TBI. A number of OOR MV variables and respiratory physiologic variables were found to be significant (Fig 1). Longer durations of exposure to OOR tidal volume, PEEP and plateau pressure were identified as top contributors with longer OOR durations predictive of unfavorable outcome.

Conclusion:

These results indicate that exposure to non-lung protective MV may contribute to clinical and neurological outcomes in stroke and TBI patients. They support the need for clinical trials evaluating optimal MV strategies in this population.

Image :

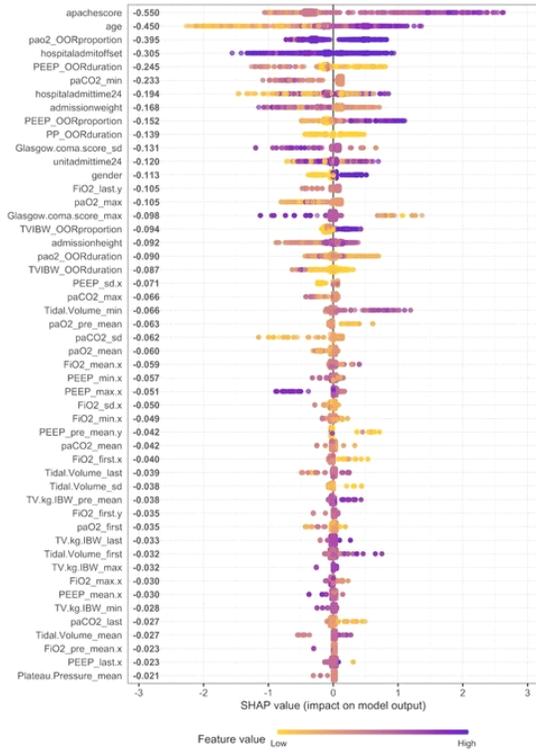
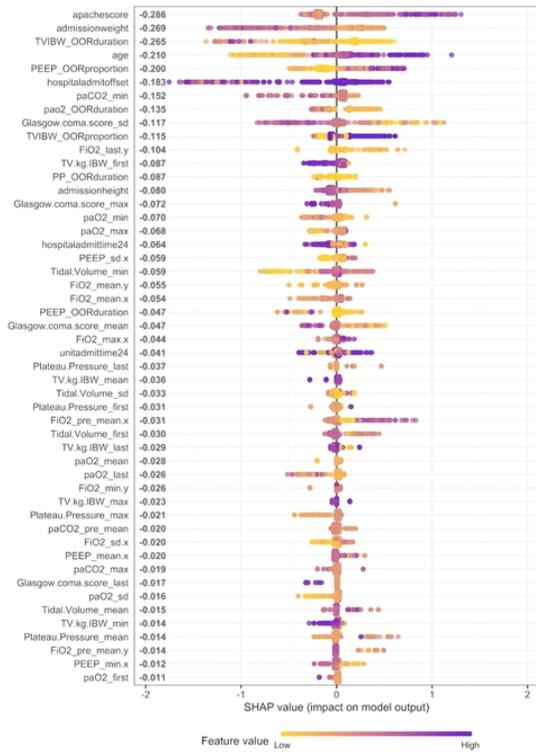


Figure 1. Feature ranking of top 50 features for TBI combined model (left) and stroke combined model (right). Negative SHAP value association with favorable outcomes and positive SHAP associated with unfavorable outcomes.