

# An exploratory study on physiological indicators for subtyping delirium\*

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## Abstract

**Objective:** This study stands to significantly contribute to our understanding of optimal treatment strategies tailored to individual patients. Moreover, it offers valuable insights into predicting the onset and severity escalation of delirium. Our objective is to delve into the characterization of delirium, particularly concerning biomarkers of interest.

**Methods:** Seven distinct phenotype groups were identified based on utilizing the K-means clustering algorithm. To examine the potential correlation between observations and phenotype groups while accounting for unmeasured factors, the Generalized Estimating Equations (GEE) approach was employed.

**Results:** Biomarkers were recorded at four specific time points: baseline, post-surgery, 1 day after surgery, and 4-7 days after surgery. For characterizing 7-phenotype groups, significant features included the certain time points of TGF- $\beta$ 1. Similarly, Five physiological signals with respect to their different time points were distinct in 3-phenotype groups which predominantly comprising delirium patients. We highlighted the significance of IL-6 and dopamine in delirium development. Additionally, the intention to further explore the correlation between IL-6 and TGF- $\beta$ 1, while assessing the worsening severity of delirium in patients.

**Conclusion:** Our study successfully demonstrated the distinct characterization of three and seven phenotype groups based on their clustering patterns respectively, which align with specific biomarkers. These findings validate our ability to predict whether a patient is likely to develop delirium and anticipate the severity of the condition using similar means.

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