

INVITED EDITORIAL COMMENTARY



And the Beat Goes on...Heart Rate Variability After Spontaneous Intracranial Hemorrhage

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Spontaneous intracranial hemorrhage (sICH) accounts for up to 25% of all reported strokes globally and its incidence varies significantly with race and ethnicity [1]. Despite advancements in diagnosis and identification of important risk factors, these patients continue to have a high mortality and those who survive often endure significant disability. As neurointensivists, we focus our efforts on early identification of patients who may benefit from medical or surgical therapies and prevention of predictable secondary injury. In this issue of Neurocritical Care, Swor et al. [2] reported a retrospective analysis of prospectively collected data in patients presenting to their institution with sICH. The authors analyzed data collected using routine electrocardiogram studies (performed during the first 24 h) to determine heart rate variability (HRV) using two previously validated methods. The calculated indices of HRV, which are assumed to represent a secondary measure of autonomic nervous system activity, were then entered into a binary logistic regression model to predict fever. They report that patients who present with sICH and subsequently develop fever during the first 2 weeks of their hospitalization have a significantly lower mean HRV.

This study has several important strengths and limitations. The main strengths include the overall novelty of using data commonly collected in routine clinical care to identify a group of patients who may be at higher risk of developing fever early in their hospital course. Fever in patients with acute brain injury has been studied extensively. Not only is it strongly associated with poor functional outcome in patients with sICH [3], it is a potentially modifiable risk factor. The authors make

appropriate efforts to assure that HRV is independently associated with fever occurrence apart from other markers of injury severity such as the Glasgow Coma Scale Score, National Institutes of Health Stroke Scale Score, and ICH score. They thoughtfully outline potential mechanisms by which early autonomic nervous system activity may have a direct or indirect effect on fever occurrence or patient outcome after sICH.

The authors discuss several limitations of their study. These include the following: The calculation of HRV indices from only 10-s ECG recording may be too short. This sampling rate would likely detect parasympathetic variability; however, it may omit the influence of sympathetic activity in the low frequency and very low frequency ranges. Secondly, the study design can only identify associations between investigated variables and cannot establish causality. Potential mechanisms for a causal relationship between early disturbances in autonomic activity and subsequent fever occurrence will need to be the topic of future research. Additionally, the results of this study show a statistically significant difference in the mean HRV between the febrile and afebrile groups. However, the clinical values for heart rate, RR interval, and HRV by both methods show considerable overlap. Therefore, there will need to be further work done to be able to apply this information to a specific patient to better understand her risk for developing an early fever and potential for benefit from fever prevention or aggressive temperature management.

This study helps us understand how we may use more of the already available clinical information that is gathered in the intensive care unit and maximize its potential benefit to our patients. It will hopefully lead us to early risk stratification and more effective avoidance of secondary injury and improved patient outcomes after sICH.

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Author contribution

K. O'Phelan developed the manuscript.

Conflict of interest

The author declare that he has no conflict of interest.

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