ATS Highlights 2022:
Critical Care Assembly Early Career Professionals

Siva Bhavani, MD, MS
Assistant Professor of Medicine
Division of Pulmonary/Critical Care
Emory University
Email:sbhava2@emory.edu
Twitter: @bhavani_md
Linkedin: https://www.linkedin.com/in/siva-bhavani-96124848/

Tell us about your yourself.
I am a pulmonary and critical care physician-scientist focused on sepsis research. I completed my internal medicine residency training at Baylor College of Medicine and my pulmonary critical care fellowship training at University of Chicago before moving to Atlanta to join Emory University as an Assistant Professor of Medicine.
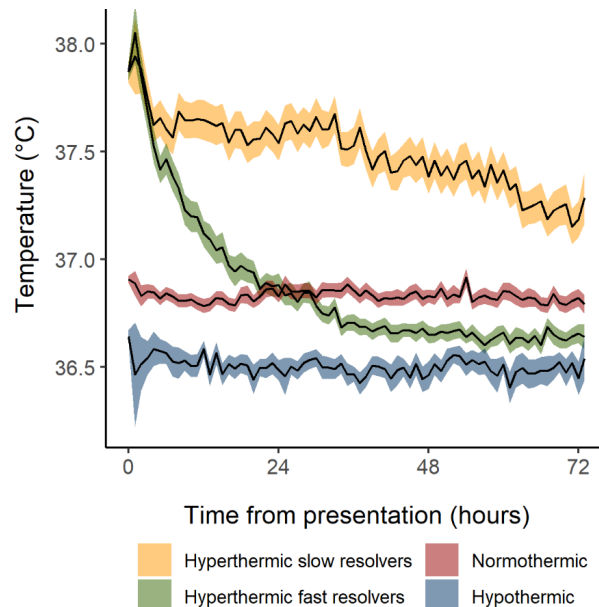
Tell us about your research.
My research focuses on moving sepsis management from a one-size-fits-all approach to a precision medicine approach by breaking apart the heterogenous sepsis syndrome into clinically relevant subphenotypes, which may have different responses to treatments. I apply machine learning algorithms to longitudinal EHR data to identify these subphenotypes.

How has the Critical Care Assembly contributed to your career?
The Critical Care Assembly has served as a great networking opportunity. Early career members like myself have missed the opportunities of in-person ATS meetings over the past few years. Through the Assembly, I've been able to network with other ATS members. I became involved with the ATS Breathe Easy podcast, and through this avenue have also met a lot of great clinicians and scientists.

ATS

Please follow us on Twitter!

@ATSCritCare

Siva Bhavani, MD, MS
Assistant Professor of Medicine
Division of Pulmonary/Critical Care
Emory University

COVID-19 Temperature Trajectories Correlate with Hyperinflammatory and Hypercoagulable Subphenotypes

Objective: Body temperature trajectories of infected patients are associated with specific immune profiles and survival. We determined the association between temperature trajectories and distinct manifestations of coronavirus disease 2019 (COVID-19).

Methods: Retrospective observational study at four hospitals within an academic healthcare system from March 2020 to February 2021 enrolling all adult patients hospitalized with COVID-19. Using a validated group-based trajectory model, we classified patients into four previously defined temperature trajectory subphenotypes using oral temperature measurements from the first 72 hours of hospitalization. Clinical characteristics, biomarkers, and outcomes were compared between subphenotypes.

Measurements and Main Results: The 5,903 hospitalized COVID-19 patients were classified into four subphenotypes: *hyperthermic slow resolvers* (n=1452, 25%), *hyperthermic fast resolvers* (1469, 25%), *normothermics* (2126, 36%), and *hypothermics* (856, 15%). **Hypothermics** had abnormal coagulation markers, with the highest D-dimer and fibrin monomers (p<0.001), and the highest prevalence of cerebrovascular accidents (10%, p=0.001). The prevalence of venous thromboembolism was significantly different between subphenotypes (p=0.005), with the highest rate in **hypothermics** (8.5%) and lowest in *hyperthermic slow resolvers* (5.1%). *Hyperthermic slow resolvers* had abnormal inflammatory markers, with the highest C-reactive protein, ferritin, and interleukin-6 (p<0.001). *Hyperthermic slow resolvers* had increased odds of mechanical ventilation, vasopressors, and 30-day inpatient mortality (OR 1.58, 95% CI 1.13-2.19) compared to **hyperthermic fast resolvers**. Over the course of the pandemic, we observed a drastic decrease in the prevalence of *hyperthermic slow resolvers*, from representing 53% of admissions in March 2020 to less than 15% by 2021. We found that dexamethasone use was associated with significant reduction in probability of *hyperthermic slow resolvers* membership (27% reduction, 95% CI 23 to 31%; p<0.001).

Conclusions: **Hypothermics** had abnormal coagulation markers, suggesting a hypercoagulable subphenotype. *Hyperthermic slow resolvers* had elevated inflammatory markers and the highest odds of mortality, suggesting a hyperinflammatory subphenotype. Future work should investigate whether temperature subphenotypes benefit from targeted antithrombotic and anti-inflammatory strategies.

Applying a validated algorithm to oral temperature measurements from the first 72 hours of hospitalization, four temperature trajectory subphenotypes were identified in a multicenter cohort of 5,903 hospitalized COVID-19 patients: hyperthermic slow resolvers (n=1452, 25%), hyperthermic fast resolvers (1469, 25%), normothermics (2126, 36%), and hypothermics (856, 15%).