

# ATS Highlights 2023: Critical Care Assembly Early Career Professionals



## Sikandar Khan, DO, MS

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### ***Tell us about yourself.***

I am a Pulmonary and Critical Care physician driven by a desire to improve post-ICU cognitive and physical function in patients with acute respiratory failure. I am currently funded by the National Institute on Aging's Paul Beeson Emerging Leaders Career Development Award (K76).

### ***Tell us about your research.***

My research is clinical-translational and focuses on the nexus of acute respiratory failure, ICU delirium, and post-ICU aging. I have an interest in using blood-based inflammatory and neurodegenerative biomarkers to develop personalized non-pharmacological interventions to mitigate ICU delirium and enhance post-ICU recovery.

### ***Where do you see yourself in 5 years?***

As a translational clinical trialist collaborating with others in the ATS community to develop and test personalized interventions for ICU delirium and post-ICU aging.

### ***How has the Critical Care Assembly contributed to your career?***

I have developed highly valued relationships and collaborations thanks to the Critical Care Assembly and very much appreciate the networking!



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## Relationship Among Clinically Obtained Biomarkers of Inflammation, Hypercoagulability, and Macrophage Activation, and Delirium in Critically Ill Patients with COVID-19

Khan SH, Perkins AJ, Chi R, Seyffert S, Conrad P, Lindroth HL, Wang S, Mulkey M, Gao S, Khan BA. *Critical Care Explorations*. Jan 2023. DOI: 10.1097/CCE.0000000000000851

**Rationale:** Critically ill patients with COVID-19 experience high rates of delirium and coma. Whether delirium occurs through novel mechanisms in COVID-19 is not known. We analysed the relationship among biomarkers of inflammation (C-Reactive Protein), hypercoagulability (D-dimer), and lung macrophage activation (ferritin), and the primary composite outcome of delirium/coma next day. We also measured associations between biomarkers and next day delirium and coma independently, and delirium severity.

**Methods:** We conducted a retrospective, observational, cohort study at Intensive care units (ICU) at two large, urban, academic referral hospitals. All consecutive adult patients admitted to the ICU from March 1, 2020, to June 7, 2020, with COVID-9 with clinical biomarkers and delirium assessments performed were included. Daily concentrations of C-Reactive Protein (CRP), D-dimer, and ferritin were obtained. Coma (assessed by RASS) and delirium (assessed by CAM-ICU/CAM-ICU-7) were measured twice daily.

**Results:** A cohort of 197 ICU patients with COVID-19 were included. Higher d-dimer (OR 1.57 95%CI 1.17,2.12,  $p < 0.01$ ) and ferritin quartiles (OR 1.36 95%CI 1.02,1.81,  $p < 0.01$ ) were associated with greater odds of delirium/coma next day. D-dimer was associated with greater odds of next day delirium (OR 1.49 95%CI 1.14, 1.94,  $p < 0.01$ ) and coma independently (OR 1.52 95%CI 1.08,2.14,  $p = 0.017$ ). Higher ferritin quartiles were associated with greater odds of next day delirium (OR 1.33 95%CI 1.04, 1.70,  $p = 0.026$ ) and coma independently (OR 1.59 95%CI 1.14,2.23,  $p < 0.01$ ).

**Conclusions:** Our hypothesis-generating study found d-dimer and ferritin were associated with delirium/coma the following day, as well as delirium and coma independently.

### Associations Between Daily Biomarker Quartiles and Delirium Versus Normal and Coma Versus Normal Observed the Following Day ( $n = 197$ )<sup>a</sup>

Variable	Delirium vs Normal		Coma vs Normal	
	OR (95% CI)	p	OR (95% CI)	p
Model 1: C-reactive protein quartile	1.05 (0.85–1.30)	0.655	1.36 (1.03–1.79)	0.030
Model 2: D-dimer quartile	1.49 (1.14–1.94)	0.003	1.52 (1.08–2.14)	0.017
Model 3: Ferritin quartile	1.33 (1.04–1.70)	0.026	1.59 (1.14–2.23)	0.007

OR = odds ratio.

<sup>a</sup>Results were obtained from generalized mixed-effects multinomial models with daily outcomes with three levels (delirium, coma, or cognitively normal) adjusting for age, race, sex, daily Acute Physiology and Chronic Health Evaluation-II calculated on day of delirium or coma assessment, Charlson Comorbidity Index, hypertension, daily mechanical ventilation status, and time (d).

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