

KEYNOTE: An Examination of Early Transfers to the ICU Based on a Physiologic Risk Score

Speaker: Carri W. Chan, Columbia University

Time: 11:00 a.m. - Noon

Carri is an Associate Professor in the Division of Decision, Risk, and Operations at Columbia Business School. Her primary research interests are in data-driven modeling of complex stochastic systems, dynamic optimization, and queueing with applications in health-care operations management. Her current focus is on combining empirical approaches with mathematical modeling to develop evidence-based approaches to improving patient flow through hospitals, and particularly intensive care units. She completed her PhD at the Information Systems Laboratory in the Department of Electrical Engineering at Stanford University. She did her undergraduate studies at MIT.

Abstract: Unplanned transfers of patients from general medical-surgical wards to the Intensive Care Unit (ICU) can occur due to unexpected patient deterioration. Such patients tend to have higher mortality rates and longer lengths-of-stay than direct admissions to the ICU. As such, the medical community has invested substantial efforts in the development of patient risk scores with the intent to identify patients at risk of deterioration. In this work, we consider how one such risk score could be used to trigger proactive transfers to the ICU. We utilize a retrospective dataset from 21 Kaiser Permanente Northern California hospitals to estimate the potential benefit of transferring patients to the ICU at various levels of patient risk of deterioration. In order to reduce the sensitivity of our findings to key identification and modeling assumptions, we use a combination of multivariate matching and instrumental variable approaches. We also study the impact of parameter uncertainty that arises when models are estimated from real world data and provide recommendations that are robust to unavoidable parameter misspecification and estimation errors. We find that proactively transferring the most severe patients could reduce mortality rates and lengths-of-stay without increasing other adverse events; however, proactive transfers should be used judiciously as being too aggressive could increase ICU congestion and degrade quality of care.