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Evaluation of a Split Flow Model for the Emergency Department

Abstract

Split flow models, in which a physician rather than a nurse performs triage, are increasingly being used in hospital emergency departments (EDs) to improve patient flow. Before deciding whether such interventions should be adopted, it is important to understand how split flows causally impact patient flow and outcomes. We employ causal inference methodology to estimate average causal effects of a split flow model on time to be roomed, time to disposition after being roomed, admission decisions, and ED revisits at a large tertiary teaching hospital that uses a split flow model during certain hours each day. We propose a regression discontinuity (RD) design to identify average causal effects, which we formalize with causal diagrams. Using electronic health records data (n = 21,570), we estimate that split flow increases average time to be roomed by about 4.6 minutes (95% CI: [2.9,6.2] minutes) but decreases average time to disposition by 14.4 minutes (95% CI: [4.1,24.7] minutes), leading to an overall reduction in length of stay. Split flow is also found to decrease admission rates by 5.9% (95% CI: [2.3%, 9.4%]) but not at the expense of a significant change in revisit rates. Lastly, we find that the split flow model is especially effective at reducing length of stay during low congestion levels, which mediation analysis partly attributes to early task initiation by the physician assigned to triage.

Biography

Dr. Zayas-Caban is the Jane R. and Jack G. Mandula Assistant Professor in the Industrial and Systems Engineering Department at the University of Wisconsin-Madison. He also holds an affiliate appointment with the Berbee Walsh Department of Emergency Medicine in the School of Medicine and Public Health. His research is in operations research with an emphasis on healthcare delivery. His recent focus is on emergency department admission decisions and care transitions. He also has some recent work on evaluating the impact of diverting non-violent offenders to substance use disorder treatment. Before coming to Wisconsin, Gabriel was a President's Postdoctoral Fellow at the University of Michigan and completed his Ph.D. at Cornell University's Center for Applied Mathematics, advised by Professor Mark E. Lewis. He received his B.A. in Mathematics from the University of South Florida.