

B I - C O M A T H E M A T I C S C O L L O Q U I U M

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***“Improving Emergency Department
Crowding via Operations Research
Guided Causal Inference”***

Monday, February 28, 2022, 4:10 pm

HYBRID: In Person, Park 338 or Remote via Zoom

<https://brynmawr-edu.zoom.us/j/97000669644?pwd=QUJmQzRvWDINSXpoMC92dHdrYm1UUT09>

Meeting ID: 970 0066 9644 Passcode: 156757

Abstract:

This paper provides evidence that the arrival of an additional low-acuity patient substantially increases the wait time to start of treatment for high-acuity patients, contradicting the long-standing prior conclusion in the medical literature that "the effect is negligible." Whereas the medical literature underestimates the effect by neglecting how delay propagates in a queuing system, this paper develops and validates a new estimation method based on queuing theory, machine learning, and causal inference. Wait time information displayed to low-acuity patients provides a quasi-randomized instrumental variable. This paper shows that a low-acuity patient increases wait times for high-acuity patients through pre-triage delay; delay of lab tests ordered for high-acuity patients; and transition-delay when an ED interrupts treatment of a low-acuity patient in order to treat a high-acuity patient. Hence high-acuity patients' wait times could be reduced by: reducing the standard deviation or mean of those transition delays, particularly in bed-changeover; providing vertical or "fast track" treatment for more low-acuity patients, especially ESI 3 patients; standardizing providers' test-ordering for low-acuity patients; and designing wait time information systems to divert (especially when the ED is highly congested) low-acuity patients that do not need ED treatment.

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