

CEH SEMINAR: DR. JUSTIN J. BOUTILIER

Personalizing Tuberculosis Treatment Adherence Support

HOST: DR. SANJAY MEHROTRA

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Tuberculosis (TB) is a global health priority and ending the TB pandemic is part of the United Nations Sustainable Development Goals. Lack of patient adherence to treatment protocols is the main barrier to reducing the global disease burden of tuberculosis. In this talk, we will study the operational design of a treatment adherence support platform that requires patients to verify their treatment adherence on a daily basis. To do this, we partner with Keheala, a TB treatment adherence support provider in Kenya and use data from a completed randomized controlled trial. First, we investigate who should be enrolled on the platform by evaluating who benefits from treatment adherence support. We use a causal forest framework to estimate heterogeneous treatment effects and demonstrate that differentiated care can improve program efficiency and reduce inequity in treatment outcomes. Second, we use an empirical framework to quantify the impact of human “support sponsor” outreach on subsequent patient verification behavior. Finally, we develop an algorithm that approximates one step of policy iteration and relies on machine learning to personalize support sponsor outreach. Our analysis establishes that patient verification can be increased by personal sponsor outreach and that patient behavior data can be used to identify at-risk patients for targeted outreach. This work represents an important step towards shifting the current TB treatment adherence paradigm from observational (i.e., monitoring and collecting data on patient adherence) to actionable (i.e., combining behavioral data with analytics to improve patient adherence in a personalized manner).


### BIOGRAPHY


Justin J. Boutilier is the Charles Ringrose Assistant Professor in Industrial and Systems Engineering and a Faculty Affiliate in Emergency Medicine at the University of Wisconsin – Madison. His research focuses on combining optimization and machine learning to improve the quality, access, and delivery of healthcare in a variety of settings. He is particularly interested in global health projects involving emergency response or digital health technologies, and he has ongoing projects with local stakeholders in India, Kenya, and Colombia. Justin’s impactful work has been recognized by INFORMS: his papers have once been runner-up (2020) and twice finalist (2021, 2022) for the Pierskalla Best Paper Award, honorable mention for the Doing Good with Good OR Paper competition (2021), and as a PhD student, Justin won the Seth Bonder Scholarship for Applied Operations Research in Health Services (2017). Justin received his B.Sc. in Mathematics and Statistics from Acadia University, and his Ph.D. in Operations Research from the University of Toronto. Prior to joining the University of Wisconsin, he was a postdoctoral associate with the Humanitarian Supply Chain Lab and the Center for Transportation and Logistics at MIT.



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 11 a.m. - 12 p.m. CDT

 Monday,  
April 10th, 2023

 Virtual  
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