



**Golub Capital Social Impact Lab**

@GSBsiLab



A new causal inference method paper about problems where data is distributed across multiple confidential databases (e.g. school systems, governments, hospitals)... whose origins lie in a high-stakes challenge we faced in 2020!

Here's the story... 1/9

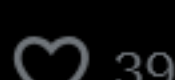
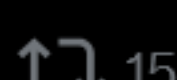


onlinelibrary.wiley.com

Federated causal inference in heterogeneous observation...

We are interested in estimating the effect of a treatment applied to individuals at multiple sites, where data is store...

3:53 PM · Aug 9, 2023 · 11.5K Views



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At the start of the pandemic, it was urgent to find existing drugs to help treatment while new ones were developing. But how?

One way: seeing if patients already taking drugs have better outcomes and prioritize promising candidates for further study or randomized trials 2/9



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First challenge: compare outcomes for patients already taking a drug before their COVID infection, to those that were not, but where patients are otherwise similar in their expected prognosis from COVID. 3/9

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Second challenge: Data is siloed in different hospital systems, each with a different patient mix and different environment, but data cannot be shared across hospitals. No single hospital has enough data to learn about how patient characteristics affect outcomes. 4/9



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Solution: Federated Causal Inference!

We propose federated methods that allow researchers to efficiently estimate treatment effects by requesting summary statistics from each hospital in one-shot and avoid iteratively sharing information across hospitals. 5/9



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The federated methods estimate parameters of treatment assignment models and outcome prediction models to ensure doubly-robust estimation of treatment effects, with variance equivalent to what would be possible if the data sets were pooled. 6/9



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We map different assumptions about the stability of models across hospitals to different estimation procedures. We also show how to estimate std errors that allows for federated inference of treatment effects. 7/9



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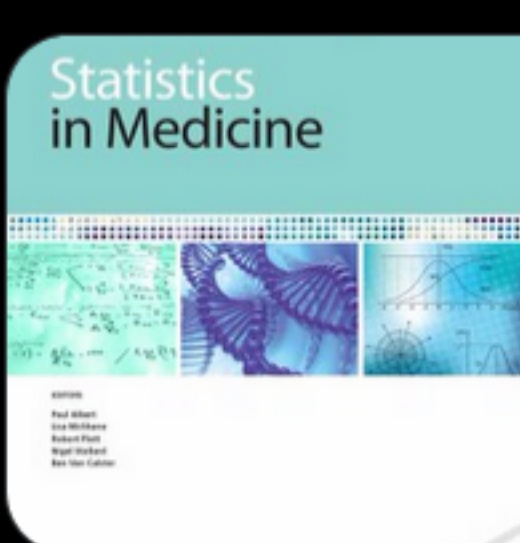


We present a case study evaluating the impact of alpha-blockers, commonly prescribed prostate drug, on respiratory illness outcomes

Read this project by @XiongRuoxuan @allisonkoe, M Powell, Zhu Shen, @jovo and @Susan\_Athey in the link below:

[onlinelibrary.wiley.com/doi/10.1002/si...](https://onlinelibrary.wiley.com/doi/10.1002/si...)

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Federated causal inference in heterogeneous obser...

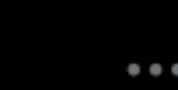
We are interested in estimating the effect of a treatment applied to individuals at multiple sites, ...



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Sidebar: For more on the challenges involved in estimating the impact of drugs using non-experimental data from health records, which is only possible in specific circumstances, see this paper: [frontiersin.org/articles/10.33...](https://frontiersin.org/articles/10.33...) 9/9



frontiersin.org

Frontiers | Ten Rules for Conducting Retrospective ...

Since the beginning of the COVID-19 pandemic, pharmaceutical treatment hypotheses have ...



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**Ruoxuan Xiong** @XiongRuoxuan · Aug 9, 2023

Replying to @GSBsiLab @allisonkoe and 2 others

Here is the arxiv link [arxiv.org/abs/2107.11732](https://arxiv.org/abs/2107.11732) for those who don't have access to Wiley open library



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