Advanced methods for cancer policy research using big data

Blythe Adamson, PhD, MPH
Senior Quantitative Scientist, Flatiron Health

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“Cancer injustice is not a scientific problem. It is a policy problem. We need to level the playing field.”

Dr. Yousuf Zafar
How can we use rich data sources to test the effect of healthcare policies?
Case studies of analytic methods to evaluate healthcare policy with real world data

Difference-in-Differences

Interrupted Time Series

Natural Language Processing
Hypothesis: ACA Medicaid expansion reduced disparity in timely treatment of black patients compared to white patients with advanced cancer.
Data linkage to fill gaps

EHR

- Diagnosis
- Visits
- Demographics
- Labs
- Therapies
- Pathology
- Discharge Notes
- Physician Notes
- Radiology Report

Structured Data Processing

Unstructured Data Processing

Common Database

Data Linkage
Medicaid expansion associated with reduction in racial disparities in timely treatment of advanced cancer

Adjusted rate of timely treatment (%)

- White: 48.3
- Black: 43.5

-4.8% points
p < 0.001

Not Expanded
Medicaid expansion associated with reduction in racial disparities in timely treatment of advanced cancer

- White: 48.3% (50.3 ± 49.6; -4.8% points, p < 0.001)
- Black: 43.5% (50.3 ± 49.6; -0.8% points, p = 0.63)
Medicaid expansion associated with reduction in racial disparities in timely treatment of advanced cancer

- Adjusted rate of timely treatment (%)
  - White: 48.3
  - Black: 43.5
  - Reduction: -4.8% points (p < 0.001)
  - Expanded: 50.3
  - Not Expanded: 49.6
  - Reduction in disparity: 4.0% points (p = 0.042)

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Case Study 2

Association Between FDA Label Restriction and Immunotherapy and Chemotherapy Use in Bladder Cancer

Parikh et al. *JAMA*, 2019

Interrupted time series regression helped predict the counterfactual - What would have happened without this policy?
Flatiron + Fred Hutch
Case Study 3

Effectiveness of checkpoint inhibitors among lung cancer patients living with HIV compared to no HIV

Natural language processing helped identify people historically excluded from clinical trials
Analytic methods used to test hypotheses and inform healthcare policy design with real world data

- **Difference-in-Differences**
- **Interrupted Time Series**
- **Natural Language Processing**
Thank You

CONTACT INFO
badamson@flatiron.com
@DrBlytheAdamson
blytheadamson.com
Illustration comparing equality and equity. On the left, children stand on an equal height platform, watching soccer. On the right, children stand on different height platforms, watching soccer. The text reads "Equality" on the left and "Equity" on the right.