Using EHR Data for Low-Value Care Research
Friday, September 7, 2018 from 3:30-4:30pm ET

AcademyHealth and ABIM Foundation Webinar
Sponsored by the ABIM Foundation

Moderator:
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Presenters:
Philip Payne, PhD
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Webinar/Call Information

• As a courtesy, please mute your computer microphone or mute your phone line when you are not speaking.

• We will be recording today’s webinar and will share the recording after the webinar.

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We look forward to your engagement!
Practical Considerations When Leveraging EHR Data for Research

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Evolution: the changing landscape of data generation in the healthcare environment
But, EHRs are not (currently) designed for research...

- Hierarchical (visit-oriented) vs. longitudinal (patient-oriented) data models
- Computational costs of queries and other analytics activities when applied to operation data “stores”
- Privacy, security, and confidentiality concerns
- Revenue-cycle and medical-legal documentation requirements
- Support for extensions and integration of external tools/methods
Given this landscape, how do I leverage data generated in the healthcare delivery environment for research?

3 Critical Questions You Can and Should Answer
Question 1: do I know where the data I need is located and how can I access it?

- EHR-Derived Data Assets
  - Discrete Data
  - Notes
  - Clinical Activities
  - 40%

- Other Data Sources
  - Bio-Molecular Imaging
  - Sensor
  - Patient Reported Research Specific
  - Financial Operations
  - 60%
Question 2: once I gain access to my data, how do I integrate and harmonize it?
Question 3: is my newly integrated data “fit for use” given my driving research questions?

- Quality is “in the eye of the use case”
  - Corollary: there is not such thing as general “data quality”

- Verification and validation of data are two distinct questions:
  - Verification: is the data present in a format and with content of a type that I expect?
  - Validation: is that data capable of enabling me to answer my question(s)?

A Few Final Thoughts...

Systems thinking as a central facet of enabling pragmatic research
Unique Issues to Consider When Examining the Causes and Impact of Low-Value Care

1) Data granularity and content coverage
2) Temporal reasoning
3) Additional privacy, confidentiality, and data ownership/stewardship concerns
A systems-thinking approach to leveraging EHRs for research

- Systematic review of measures and methods that can be used to define “fitness for use” of data in EHRs when conducting clinical research

- Critical dimensions of this domain enumerated:
  - **Completeness**: Is a truth about a patient present in the EHR?
  - **Correctness**: Is an element that is present in the EHR true?
  - **Concordance**: Is there agreement between elements in the EHR, or between the EHR and another data source?
  - **Plausibility**: Does an element in the EHR make sense in light of other knowledge about what that element is measuring?
  - **Currency**: Is an element in the EHR a relevant representation of the patient state at a given point in time?

Weiskopf and Weng, JAMIA, 2012
Data Science, Decision Science, and Value Based Care

Daniella Meeker, PhD
Using EHR Data for Low-Value Care Research
September 7, 2018
Overview

- Using EHR data for measurement and profiling operational workflow
- Measuring and Optimizing Individual Performance for VBC
Data to Information

EHR data for feedback, process measurement, and decision support
Theory vs. Reality of using EHRs for VBC

- All vendors that are certified support computation of eCQMs, including value/efficiency metrics.

- *Even if they worked*, built-in metrics endorsed by CMS as eCQMs for EHR use are not necessarily functional, harmonized, important, or relevant to operational goals and incentive programs.

- To learn and improve practices, attribution of patients & outcomes to programs & providers is critical.
How can medicine catch up with the rest of consumer information technology?

● How do we turn small data into big data for optimization?
  ○ *Despite the same vendors, every departmental implementation is like its own app, with distinct data generation, workflows, and diffuse outcomes.*

● Develop a patient centered **model process** to combine information about business process and data to connect process variations with outcomes.

● Map data to the model and maintain as processes and outcomes of interest change
1. Conceptual Clinical Process Model
2. Functional Data Generation Model
3. Operational Data Analysis Model
4. Analysis Outcomes for Feedback and Decision Support

EHR Data

~1000 hours

Analysis Data

Actionable, Attributable Information for VBC
Optimizing Individual Performance

Value-Based Care for Improving Quality and Equity

Using EHRs to Apply Decision Science to VBC
SYSTEM 1
Intuition & instinct

95%
Unconscious
Fast
Associative
Automatic pilot

SYSTEM 2
Rational thinking

5%
Takes effort
Slow
Logical
Lazy
Indecisive

Source: Daniel Kahneman
Decision Fatigue: Judicial Decisions Revert to Path of Least Resistance

Extraneous factors in judicial decisions

Shai Danziger$^a,^1$, Jonathan Levav$^b,^1,^2$, and Liora Avnaim-Pesso$^a$

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Edited by Daniel Kahneman, Princeton University, Princeton, New Jersey

Are judicial rulings based solely on laws and facts? A growing body of evidence holds that judges apply legal reasons to the facts in an emotional, mechanical, and deliberative manner. In contrast, some argue that the rational application of legal rules is impossible in practice. An analysis of 10,000 cases in the New York Court of Appeals suggests that judges tend to favor their own past decisions, even when the new case is objectively stronger. This phenomenon, termed “decision fatigue,” occurs because judges are more likely to issue opinions that are similar to their previous decisions, rather than making a careful and objective assessment of the new case. The graph shows the proportion of favorable decisions as a function of ordinal position, with a decrease in proportion as the position increases, indicating a trend towards similarity and repetition rather than innovation.
Decision Fatigue Reveals Habits and Intuitions

SYSTEM 2
Rational thinking

SYSTEM 1
Intuition & instinct
Decision Fatigue Reveals Habits and Intuitions

Proportion favorable decisions

Ordinal position

SYSTEM 2
deliberative

SYSTEM 1
defensive
Differential diagnosis
Cost-benefit analysis

SYSTEM 1
Intuition & instinct

Order diagnostic before considered prognosis
Refer to specialist
Prescribe antibiotic

SYSTEM 2
Rational thinking

Differential diagnosis
Cost-benefit analysis

Source: Daniel Kahneman
HYPOTHESIS

The Fee For Service environment has cultivated low-value habits and instincts that we can detect and address with EHRs.

Source: Daniel Kahneman
Time of Day and the Decision to Prescribe Antibiotics
Decision fatigue reveals “System 1” practices and FFS habits
Emergency Medicine

A decision fatigue factory
The Data

- 2 years of Electronic Medical Records
- 26 Emergency Departments
- 1024 Emergency Physicians
- Time-stamped EHR events mapped to operational model
- Metrics re-coded so that performance success is “1” and failure is “0”.
- Patient Race - imputed by zip code*
- Decision Fatigue - operationalized as time in shift

*CAVEAT

Each ED will have independent data and process idiosyncrasies. Interpretation and analysis of EHR data must account for systematic missingness and other errors.
### The Metrics (mostly from federal programs)

#### Efficiency (best NOT TO order something)
- CT scan (all patients)
- **Opioid Prescribing (all patients)**
- CT for headache patients
- CT for low back pain patients

#### Process (best TO order something)
- (No) pregnancy test for females with stomach pain
- (No) lactic acid measurement for septic patients
- (No) antibiotic order for septic patients
- (No) EKG for non-traumatic chest pain patients
Decision Fatigue: Error Rate* Over All Efficiency Metrics Over Time in Shift
Decision fatigue revealed high-utilization habits for efficiency metrics.
• Very high compliance overall (95%)
• In this case we observed the deterioration over the course of the shift, even in a “DO SOMETHING” measure.
• (i.e. our hypothesis that physicians would increase test use with fatigue was not necessarily supported)
Decision fatigue also exposed errors in appropriate use metrics

- In this case we observed the deterioration over the course of the shift, even in a “DO SOMETHING” measure.
- (i.e. our hypothesis that physicians would increase test use with fatigue was not necessarily supported)
Decision-Fatigue: A Truth Serum for Disparities?

Cognitive habits interact with low-value practices.
In controlled experiments, officers and students over-react defensively & with disproportionate racial bias when they are sleep-deprived or cognitively depleted.
Historic Disparities in Opioid Prescribing

Original Contribution
January 2, 2008

Trends in Opioid Prescribing by Race/Ethnicity for Patients Seeking Care in US Emergency Departments

Mark J. Pletcher, MD, MPH; Stefan G. Kertesz, MD, MSc; Michael A. Kohn, MD, MPP; et al

Article Information
JAMA. 2008;299(1):70-78. doi:10.1001/jama.2007.64
Minorities continue to be “protected” from opioid exposure
Whites more at risk of exposure to opioids as shift progresses
Minorities increasingly “protected” as System 1 habits are exposed by fatigue
Decision Fatigue and Inappropriate CT Scans

- Slight increase in inappropriate scans for white patients
- Sharp *decrease* in inappropriate scans for non-white patients
Implicit Bias among Physicians and its Prediction of Thrombolysis Decisions for Black and White Patients

Alexander R. Green, MD, MPH\(^1\), Dana R. Carney, PhD\(^2\), Daniel J. Pallin, MD, MPH\(^3\), Long H. Ngo, PhD\(^4\), Kristal L. Raymond, MPH\(^5\), Lisa I. Iezzoni, MD, MSc\(^6\), and Mahzarin R. Banaji, PhD\(^2\)
Decision Fatigue Impairs Quality More Acutely for Non-White Patients

note that after adjusting for facility effects, non-white pts get better care at start of shift...

...but performance deteriorates much more rapidly for non-white pts.
Decision fatigue exposes disparities in both inappropriate and appropriate care.
Conclusions

- Investment in EHR data enables measurement and introspection.
- The “Two System” psychological model is replicated in clinician performance.
- Optimizing individual performance for VBC requires changing FFS habits that resurface with decision fatigue.
- Unclear if efficiency metrics are impacted differently from active process metrics
- Racial bias may be actively suppressed by clinicians
  - If a provider is at her cognitive best, minority patients may receive better care than white patients.
  - Non-white patients are “protected” from inappropriate imaging and opioid prescribing.
  - Minority patients get proportionately fewer services, (both appropriate and inappropriate) as shift progresses.
Collaborators

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