Use of the Electronic Health Record (EHR) in Prevention Research

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Disclosures

- Worked for Kaiser Permanente for 31 years
- KP member for 35 years

Background

- When I joined Kaiser Permanente 31 years ago the EHR was a rarity
- In 2009, the federal government set adoption and meaningful use of EHR as a national goal and incentivized it
- As of 2015, 87% of U.S. physicians use some form of EHR
- As of 2014, >80% of U.S. hospitals have adopted an EHR

Objective of Talk

- Highlight the opportunities and challenges of using EHR for prevention research
- Provide some illustrative examples
- Focus primarily on the world of nonprofit managed care, which I know best
- Largely ignore the much broader class of epidemiologic and health services research that is enabled or facilitated by the EHR

What Do We Mean by the EHR?

- Content
  - What information is available
- Context
  - Nature of the population and/or care delivery setting about which we have information
- Collectively content and context define the types of research one can carry out

What Information Is Available?

- Health care utilization (both usage & outcomes)
  - Inpatient, outpatient, pharmacy, labs, imaging, genetics, …
  - Linkable over time (consistent, unique patient identifier)?
- Patient reported outcomes
  - pain, health status, …
- Registries
  - Disease specific, high risk populations (prediabetics, high utilizers)
- Patient demographics and risk factors
  - Age, sex, race, smoking, BMI, physical activity

Nature of Popn/Delivery Setting

- Managed care (e.g., Kaiser Permanente)
  - Well-defined population
  - Offers comprehensive services
  - Minimal use of outside care (typically still captured)
  - Pretty exhaustive EHR information
- Federally qualified health centers
  - Population not well-defined
  - May not offer comprehensive services
  - Outside care not well captured
  - What is in EHR may be limited
- Fee for service hospital
  - Population not well-defined
  - No or limited outpatient data

Content and Context Constrain Use

AN EXAMPLE

CONCERT: a network of delivery systems to carry out comparative effectiveness research related to COPD

- Wide mix of delivery systems added generalizability, but not all had well-defined populations
- Inpatient data was a common denominator
- Limited types of questions we could ask
  - Treatment of acute exacerbations presenting to hospital
  - Post discharge follow up studies
  - Popn-based disease mgmt and/or prevention studies much more problematic

Ways to Use the EHR to Facilitate Research

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EHR as a Recruitment Tool

- Efficient way to target specific populations of interest
  - Identify populations to be recruited independently (e.g., by phone or mail)
  - Point of service recruitment
- Once recruited, participation in a specific study can be flagged in EHR

EHR and Outcomes Assessment

PASSIVELY CAPTURE:

- health care utilization (and cost of care)
- clinical outcomes (e.g., lung function, labs)
- physical measurements (e.g., weight, BMI)
- patient reported outcomes (e.g., pain, depression)
- health behaviors (e.g., smoking)
- demographics (age, sex, race)

Prevention Index (PI)

(Vogt et al., Health Services Research, 2004; 39:511-30.)

- A novel metric for quantifying, in essence, the proportion of time in a given target interval that a person is compliant with USPSTF guidelines for select preventive services.
- Unlike HEDIS, if a screening test is delivered late during the target year, the PI diminishes in proportion to how late it occurred.
- Can be aggregated at the provider, clinic, or system level
- As with HEDIS, requires a sufficient window of observation to define who is in need of a given service.

EHR and Outcomes Assessment

CHALLENGES:

- validity of outcomes
- varying number and spacing of observations
- data harmonization over time and across sites
- missing data
- completeness of data (e.g., outside use)

EHR as an Intervention Delivery Tool

Use the EHR to give clinicians

what they need,

when they need it,

to foster evidence-based care

EHR as an Intervention Delivery Tool

- Prompts for guideline-based services
  - Flu shots, screening, needed bloodwork, …
  - Point of service alerts
  - System-generated reminders (phone/mail/email)
- Medication refill reminders
- Pop-up flags for medication contraindications
- Medication use profiles
  - e.g., controller to reliever med use for asthma
- Flag high risk populations for care/case management

Choosing a Research Topic

- Identify organizational priorities, which for managed care organizations are heavily focused on primary or secondary prevention, and ask how research can help to best achieve those goals
  - Care management for high utilizers
  - Diabetes prevention
- Best way to ensure you have a highly relevant topic and are likely to get good organizational buy-in

Case Studies

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Medication Adherence: PATIENT

(Vollmer et al., AJMC, 2014; 20:SP502-SP510)

- 1 yr, parallel arm, pragmatic clinical trial to test 2 HIT-based strategies versus UC to improve adherence to CVD meds
- 21,752 patients with diabetes or atherosclerotic cardiovascular disease from 3 Kaiser Permanente regions
- 3 study arms
  - Usual Care (UC)
  - Interactive Voice Recognition (IVR)
  - Enhanced IVR (IVR+)
- Outcomes
  - Primary: adherence
  - Secondary: BP and lipid levels

PATIENT

KEY EHR ELEMENTS:

- Ongoing EHR-based definition of newly eligible patients
- Personalized "health reports" with information pulled from EHR
- Allowed some site flexibility in how IT interventions were delivered in order to fit stakeholder priorities and needs; fostered cooperative spirit
- Leveraged existing virtual data warehouse to define population and outcomes in a consistent manner
- Worked with Health Plan to create custom fields in EHR to capture certain process data

CHALLENGES:

- Managing site-site intervention fidelity
- Integrating information from multiple, complex data sources as part of ongoing intervention delivery and outcome assessment

CRC Screening: STOP CRC

(Coronado et al., Contemp Clin Trials, 2014; 38(2):344-349)

- Cluster randomized trial to improve screening for colorectal cancer
- 41,193 patients from 26 federally qualified health clinics
- 2 study arms
  - Usual Care (UC)
  - Active intervention (mailed FIT kits)
- Outcomes
  - Primary: returned FIT kit
  - Secondary: RE-AIM implementation criteria

STOP CRC

KEY EHR ELEMENTS:

- Created tools specific to CRC screening within EPIC, including
  - a real-time updated registry of patients who are in need of screening
  - Processes for bulk ordering FIT kits and for batch communications to patients
- Created unique reports to assist clinics with scrubbing EHR data and identifying care gaps
- Intervention totally embedded within the EHR

CHALLENGES:

- Lack of a defined population … had to rely on somewhat arbitrary rules for what defined active clinic patients
- Delivering the intervention totally within the EHR made gathering tracking data more challenging than anticipated
  - Monthly snapshots of the EHR

Pain Management: PPACT

(DeBar et al., Transl Behav Med, 2012; 2:523-530)

- Cluster randomized trial to improve pain management
- 851patients with chronic pain on long term opioids from 3 Kaiser Permanente regions
- 2 study arms
  - Usual Care (UC)
  - Multidisciplinary, integrated pain mgmt embedded in primary care setting
- Outcomes
  - Primary: self reported pain severity (intensity + interference)
  - Secondary: opioid use, pain related HCU, cost

PPACT

KEY EHR ELEMENTS:

- Tiered process for collection of PRO pain data
  - Entry via online patient portal following email prompt (national build)
  - IVR calls triggered as first backup
  - Live calls triggered as second backup
- National build to add 4 item subset of Brief Pain Inventory to EHR
- National build to add Roland Morris Disability Ques to EHR
- Used the EPIC feature that allows attachment of images to chart notes so that providers could have access to detailed intake summary for intervention patients
- PPACT added as a department within the EHR to allow greater visibility of PPACT visits in the chart

PPACT

CHALLENGES:

- Many needed fields/variables were not part of existing Virtual Data Warehouse and were not always coded in a standard manner across regions
- One region underwent a substantial change in their EPIC implementation in the middle of the study and we had to accommodate this in our data systems
- Many very good tools that are available in EPIC and would have facilitated intervention delivery or outcome assessment were not built into the versions of EPIC that our regions were using

Medication Safety: SIP

(Smith et al., Arch Intern Med, 2006; 166:1098-1104)

- Interrupted time series to evaluate impact of computerized provider order entry with clinical decision support in reducing the use of potentially contraindicated agents in elderly persons
- Kaiser Permanente NW region members aged 65+ years
- Intervention: decision support that alerted clinicians to preferred alternative medications when they ordered certain nonpreferred agents that carry potential contraindications in elderly persons
  - Ultimately provider determined clinical appropriateness of the alert for any given patient
- Outcomes: rate of use of preferred and nonpreferred drugs

SIP

KEY EHR ELEMENTS:

- Alerts fully integrated into the EHR
- Alerts were presented whenever any non-preferred drug was prescribed
- Leveraged existing computerized provider order entry functionality that was already built into the EHR

CHALLENGES:

- Lack of functionality in EHR to accomplish real time alerts
  - Had to do nightly refreshes of alert lists
- Unwillingness to randomize patients (led to ITS analysis)
- Finding qualified EPIC programmers
- Health Plan concerns over "alert fatigue"
  - Needed to find a department (pharmacy) to champion the intervention

Preventive Service Use among Patients with and without Serious Mental Illness

(Yarborough et al., Amer J Prev Med, submitted)

- Retrospective cohort study
- 803,276 adults served by KPNW or a number of community health clinics
- Exposure: One of 5 categories of mental health disorders or a healthy reference group
- Outcome: Use of preventive services
  - Overall preventive care-gap rate
  - Proportion of incomplete preventive services
- Analyses adjusted for age, gender, race, ethnicity, Medicaid, Medicare, and comorbidity index

NIH HCS Research Collaboratory

- Strengthen the national capacity to implement cost-effective large-scale research studies that engage health care delivery organizations as research partners
- Provide a framework of implementation methods and best practices
- STOP CRC and PPACT are two examples
- commonfund.nih.gov/hcscollaboratory/programresources
  - Grand Rounds
  - Living Textbook
  - Knowledge Repository

PCORnet

- National patient-centered clinical research network
- Part of Patient Centered Outcomes Research Institute (PCORI) funded as part of ACA
- Designed to make it faster, easier, and less costly to conduct clinical research by harnessing the power of large amounts of health data and patient partnerships
- http://www.pcornet.org/