Selection of Databases for Pharmacoepidemiology Research

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Conflict of Interest

I am an employee of HealthCore, Inc. a wholly owned subsidiary of WellPoint.

HealthCore has administrative claims data

The thoughts and comments expressed in this presentation are my own.

Disclaimer

Available resources within pharmacoepidemiology is a dynamic environment

Resources listed in the presentation do not represent an exhaustive list of available resources

Hybrid examples and ability of resources to link expand the capabilities and functionality of pharmacoepidemiology resources

Outline

Administrative Medical Claims

Electronic Medical Records

Registries

Distributed Database Models

Administrative
Medical Claims

Administrative Claims Data

What	Who	Where	Strengths	Limitations

Insurance claims data describe the billable interactions between insured patients and the healthcare delivery system

Insurance claims databases contain insurance claims data for large numbers of patients over their medical insurance enrollment period

Insurance claims data tables fall into 4 general categories:

- Demographic & Enrollment data
- Outpatient claims
- Inpatient claims
- Pharmacy claims

Administrative Claims Data

What	Who	Where	Strengths	Limitations

Demographics & Enrollment

- Contain patient-level information
  - Date of birth
  - Gender
  - Zip code (where enrolled)
  - Benefit package
- Basic demographic information such as patient identifier number
  - Some administrative claims databases are de-identified and are therefore not linkable to external sources
- Dates of enrollment and disenrollment

Administrative Claims Data

What	Who	Where	Strengths	Limitations

Medical Claims

- Health-care services submitted for reimbursement containing patient and provider identifiers

Various sites of services

- Inpatient
- Hospital outpatient
- Emergency room
- Surgery center
- Physician's office

Various types of services

- Specialty
- Preventative
- Office-based injections
- Laboratory services
- Diagnostic imaging
- Other treatment

Administrative Claims Data

What	Who	Where	Strengths	Limitations

Pharmacy Data

- Claims for medications dispensed submitted electronically by the pharmacy at the time a prescription is filled
  - National Drug Code (US-NDC)
  - Date dispensed
  - Dosage of medication dispensed
  - Days supplied
  - Quantity dispensed

Administrative Claims Data

What	Who	Where	Strengths	Limitations

Aetna

HealthCore (WellPoint, Anthem Plans)

Humana

Optum (UnitedHealth Care)

Truven

US Medicaid

US Medicare

Administrative Claims Data

What	Who	Where	Strengths	Limitations

United States

Canadian Provincial databases

Other countries with private insurance models requiring reimbursement

Administrative Claims Data

What	Who	Where	**Strengths**	Limitations

Large size

Records virtually any billable healthcare interaction

Prescription dispensings

Accurate records when tied to reimbursement

Enrollment data

Ability to link to external resources

Administrative Claims Data

What	Who	Where	Strengths	**Limitations**

Uncertain validity of diagnosis data

- Often need to perform validation studies with access to the medical records

Access to potential confounding variables

- Smoking, alcohol consumption, race

Instability of the population

- Job changes, employers change health plans, other change in coverage

Laboratory and imaging result data capture

- Improving data linkage and capture of laboratory data

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Electronic Medical Record Data

What	Who	Where	Strengths	Limitations

Paperless, digital versions of patient chart folders

Number of office-based practices using EMR systems is continuing to increase over time

Physicians use EMRs to improve the quality of patient care

EMRs v. EHRs:

- EMR one physician practice or a group practice
- EHR ideally a system which integrates EMRs across multiple providers and care settings

Electronic Medical Record Data

What	**Who**	Where	Strengths	Limitations

Altos Solutions Oncology EMR

Cerner Health Facts

GE Healthcare EMR

HMO Research Network

Humedica

Medmining—Geisinger Health System

Premier (Inpatient data)

Hospital Corporation of America

Pediatric Health Information System (PHIS)

CPRD—United Kingdom

THIN—United Kingdom

Electronic Medical Record Data

What	Who	Where	Strengths	Limitations

Asia

Europe

United States

Worldwide through the implementation of electronic resources to capture medical events at the point of care

Electronic Medical Record Data

What	Who	Where	Strengths	Limitations

Access to primary medical record

Depth of the data resource

More complete medical history data available

Laboratory data available

Radiologic data available (in some cases)

Vital sign data

Family histories

Electronic Medical Record Data

What	Who	Where	Strengths	Limitations

Prescription orders (written not fills)

Often no enrollment table in health systems in which patients can move easily between various providers

In ability to integrate with care outside of the EMR system

Limited length of follow-up

Inconsistent data entry across and within facilities

Size (if data is from a single site)

Registry
Data

Registry Data

What	Who	Where	Strengths	Limitations

Special purpose broad observational data collection

Database from which cohorts can be derived

Often collect details of clinical care at the point of patient care

May be populated automatically from other secondary data sources

Well developed registries have strict quality quidelines

Registry Data

What	Who	Where	Strengths	Limitations

Disease or event registries

- Cancer registries
- Rare disease registries

Product registries

- May be part of a Risk Evaluation and Mitigation Strategies (REMS)

Service or procedure registries

- Device registries

Registry Data

What	Who	Where	Strengths	Limitations

Worldwide exposure

Variety of clinical and safety surveillance applications

Excellent resource AHRQ User's Guide for Patient Registries

Registry Data

What	Who	Where	**Strengths**	Limitations

Often designed to facilitate research questions

Detailed information collected

Ability to adapt over time

Data completeness and quality guidelines

Follow patients longitudinally over time

Registry Data

What	Who	Where	Strengths	**Limitations**

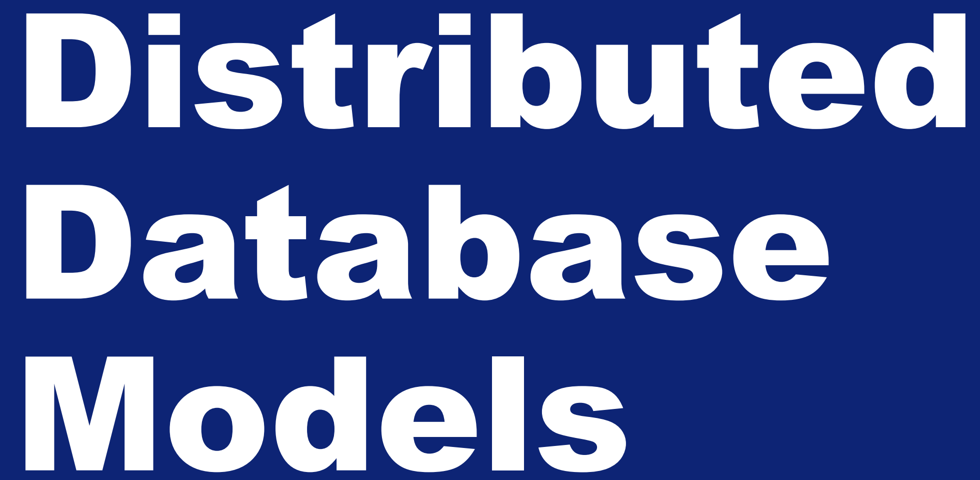
Data collection may be too broad for specific research questions

Registry creation often for descriptive aims with absence of a pre-specified hypothesis

May lack data on comparator population

Selection and recruitment of subjects

Retention of subjects for longitudinal follow-up


Distributed
Database
Models

Distributed Databases

What	Who	Where	Strengths	Limitations

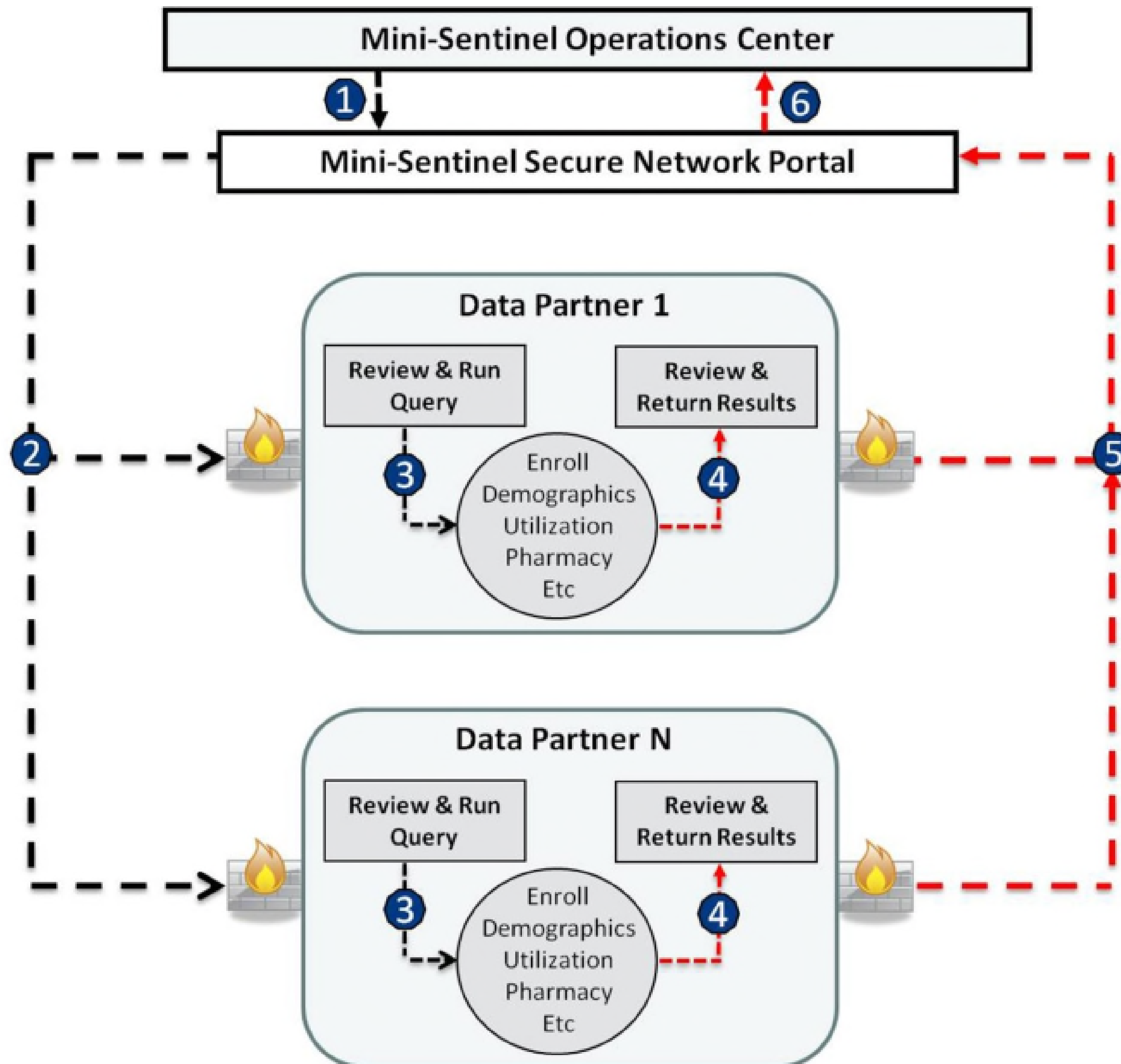
Collections of pharmacoepidemiology data resources

Common Data Model (CDM)

Centralized v. Decentralized models

Distributed code to data partners to run on common data model and return results

Mini-Sentinel distributed analysis



1- User creates and submits query (a computer program)

2- Data Partners retrieve query

3- Data Partners review and run query against their local data

4- Data Partners review results

5- Data Partners return results via secure network

6 Results are aggregated and returned

Distributed Databases

What	Who	Where	Strengths	Limitations

Mini-Sentinel now transitioning into Sentinel

Observational Medical Outcomes Partnership (OMOP) now transitioned into the Innovation in Medical Evidence Development and Surveillance (IMEDS) Program and integration into Observational Health Data Sciences and Informatics (OHDSI)

European Network of Centres for Pharmacoepidemiology and Pharmacovigilance (ENCePP®)

Distributed Databases

What	Who	Where	Strengths	Limitations

United States

Canada

Europe

Distributed Databases

What	Who	Where	Strengths	Limitations

Collaborative efforts across diverse data sources

Enhanced access to subgroups

Ability to study rare diseases and rare exposures in large defined populations

Ability to perform active surveillance in postmarrketing of medical products

Distributed Databases

What	Who	Where	Strengths	Limitations

Use of different coding systems requiring validation efforts

Heterogeneity across data partners in formularies and coding practices

Data updates and time consuming QA/QC

Full granularity of source data

Time consuming development of data standards

Tracking individuals as they move across medical systems

Discussion

Other Sources of Pharmacoepidemiology Data Resources

What are some other sources of pharmacoepidemiology data?

Where are these resources located?

Who has access to these resources?

What are the strengths of these resources?

What are the limitations of these resources?