Harnessing EHR Data for Local Population Health Monitoring

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Sara Schmitt, Director of Community Health Policy, Colorado Health Institute

Kate Horle, Chief Operating Officer, CORHIO

Agenda

- **Why data is important for population health improvement**
- **Introduction to CHORDS and how it works**
- **Governance structure**
- **Why EHR data**
- **Challenges and solutions**
- **Data queries and outcomes**
- **What we learned, how other communities can duplicate**

Key Takeaways and Findings

A geography-based shared research and public health surveillance infrastructure contributes to a robust understanding of local population health.

CHORDS is a unique distributed data network in Colorado.

Governance structures enable effective access to data for data users and reliability for data partners.

A distributed data network can function as a secure space for providers to make their data available to other clinical and public health stakeholders and it creates some technical challenges.

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Data and Population Health

- Real-time feedback to understand population health issues
- Identify trends
- Evaluate interventions
- Explore and act on disparities
- Make policy impacts

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Real-Time Public Health Research

CHORDS
Harmonizing Information for a Healthier Colorado

CHORDS is a distributed data network (DDN) conceived in 2011 that uses electronic health record (EHR) data to support public health evaluation, monitoring and research efforts.

CHORDS Data Partners

Health Systems

- Children's Hospital Colorado
- Denver Health
- Kaiser Permanente Colorado

Mental Health Centers

- Mental Health Center of Denver
- Jefferson Center for Mental Health

Safety Net Providers

- Clinica Family Health
- Colorado Alliance for Health Equity and Practice
- Colorado Coalition for the Homeless
- High Plains Community Health Center
- Metro Community Providers Network
- Salud Family Health Centers
- Clinica Tepeyac

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How is CHORDS different?

- A <u>fully</u> distributed and federated network

- Integrates primary care, inpatient, and mental health center data

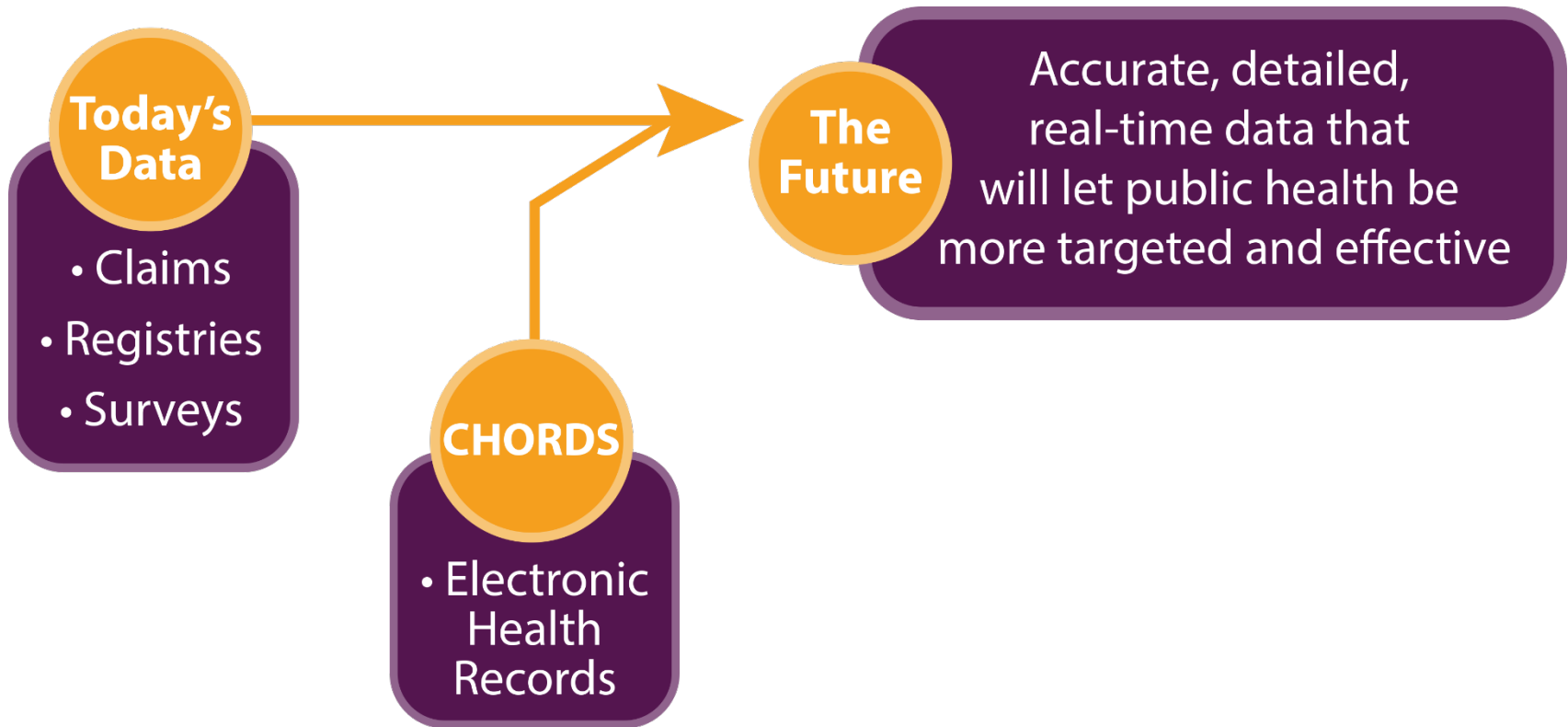- Shared infrastructure for public health and research

The Promise of Innovation

Today's Data

- Claims
- Registries
- Surveys

CHORDS

- Electronic Health Records

The Future

Accurate, detailed, real-time data that will let public health be more targeted and effective

How does CHORDS exchange data?

Data Requester Seeking Information

Includes public health agencies, researchers, others.

CHORDS PopMedNet Query Portal

Authorized requesters access the portal through a web browser and submit their data query.

Each CHORDS Data Partner Site: *Health Care and Mental Health Providers*

PopMedNet Client and Administrator

Site receives new query. PopMedNet administrator reviews the query and decides whether to execute it.

Firewall

Partner DataMart Administrator

Query is run using a DataMart client software application. A site's DataMart is regularly updated with standardized data from electronic health records.

DataMart (Virtual Data Warehouse)

Portal aggregates results from partners and returns data to requester.

DataMart administrator decides whether to release results back to portal.

DataMart returns results to DataMart administrator.

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Public Health and Research Requests

Research Topics:

- Asthma Exacerbation Index
- Adolescent Pregnancy and LARCs
- Spinal Fusion Procedures and Opioids

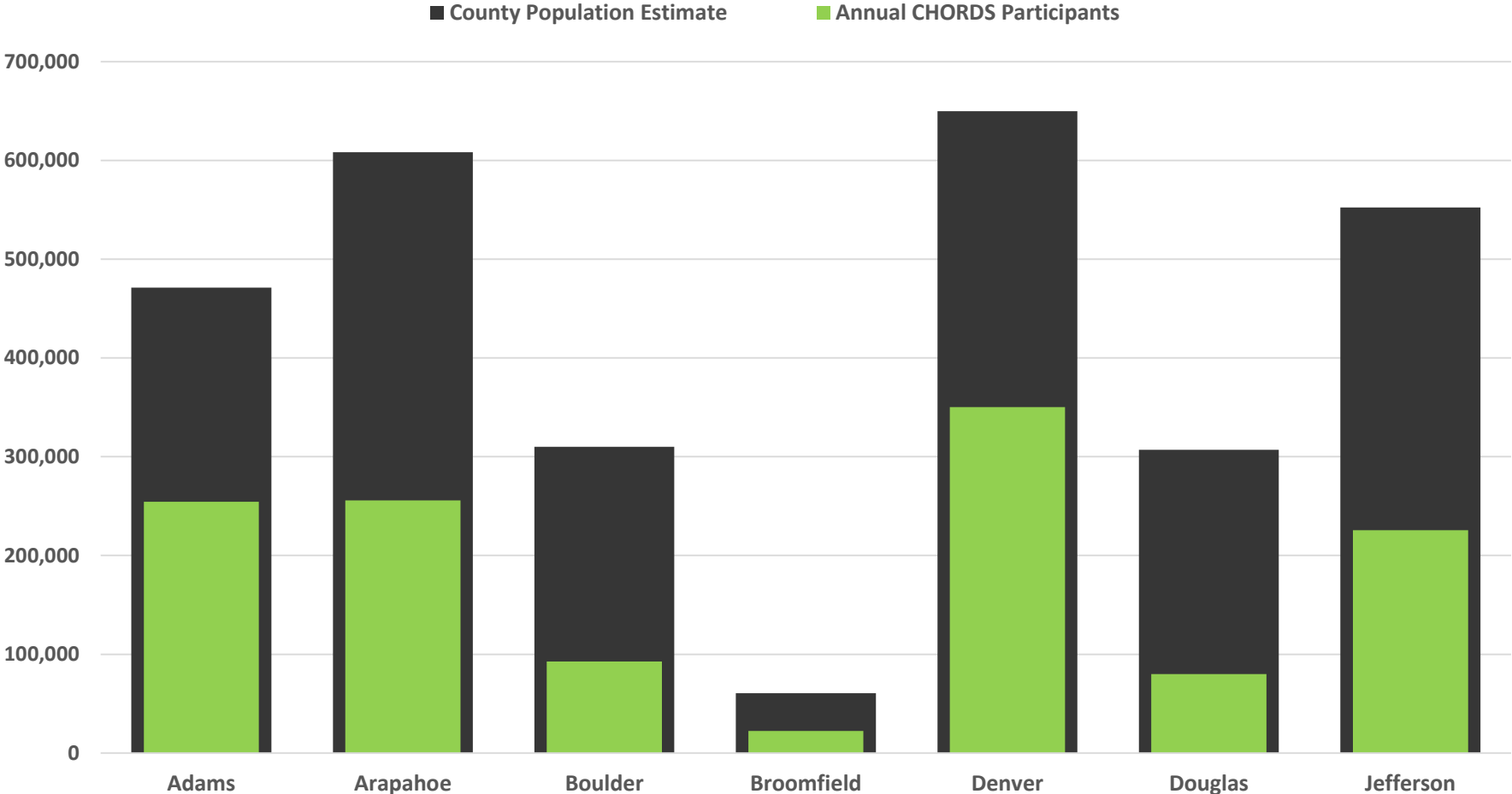**Prevalence Data by Geographic and Demographic Filters**:

- Depression
- Hypertension
- Diabetes
- Adult/Child BMI
- Tobacco
- Opioid Use Disorder
- Marijuana Abuse
- Mental Health and Pregnancy

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How It Works
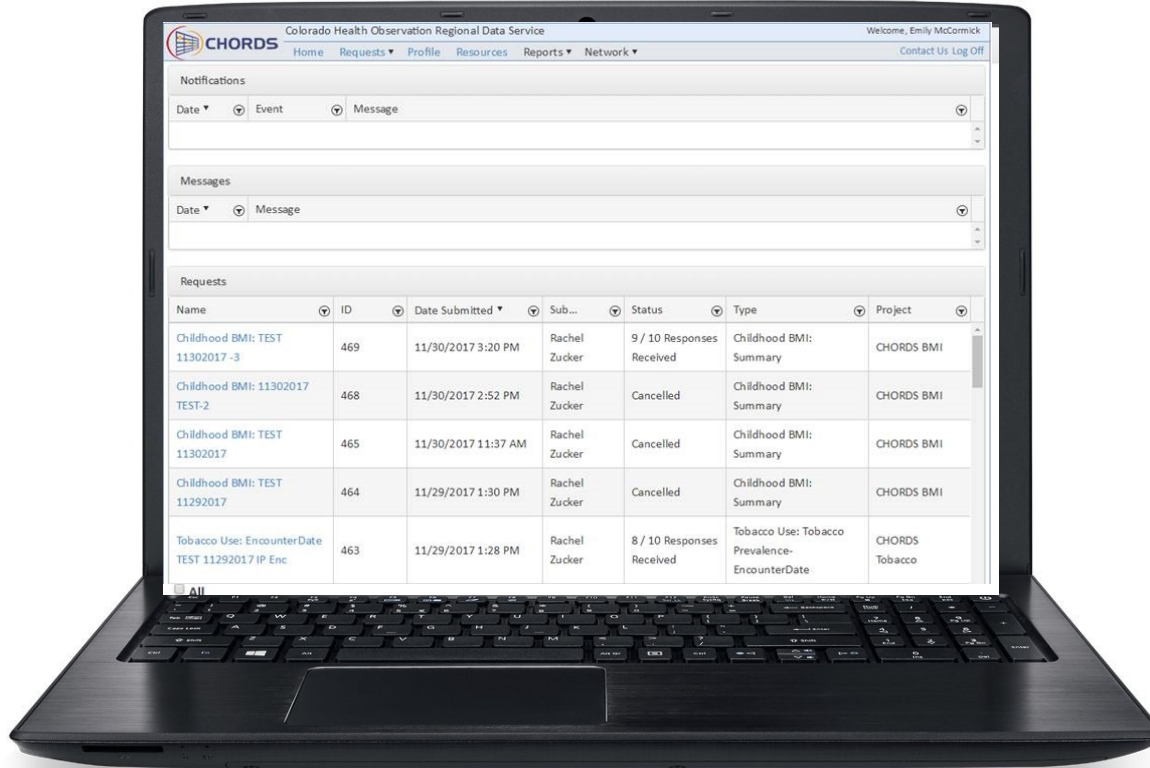
Researchers query a specific health question and data is returned from different healthcare systems Gender, Race, Age, Geographic Location
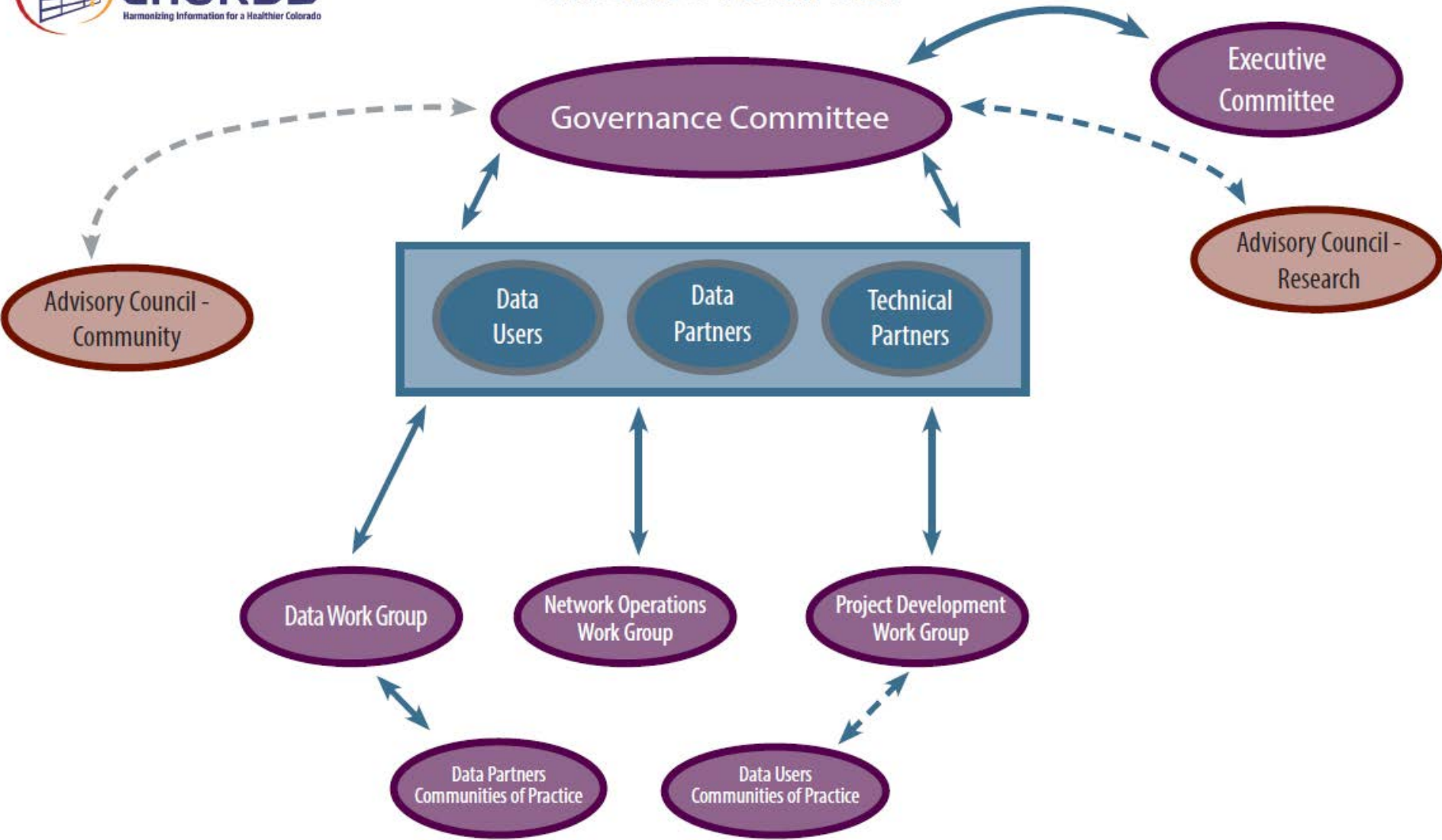
How representative is CHORDS?

Legend: ■ County Population Estimate ■ Annual CHORDS Participants

Categories: Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson

CHORDS Data

Over-represented

- Children under 18
- Women
- Hispanics
- Individuals at or below the poverty line
- Sick

Under-represented

- Men
- Young adults (18-24)
- Uninsured individuals

CHORDS Network

CHORDS — Harmonizing Information for a Healthier Colorado

Governance Committee

Executive Committee

Advisory Council - Research

Advisory Council - Community

Data Users

Data Partners

Technical Partners

Data Work Group

Network Operations Work Group

Project Development Work Group

Data Partners Communities of Practice

Data Users Communities of Practice

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Governance

Establish, document and conduct transparent decision-making processes

Facilitate priority high-quality monitoring, evaluation and health improvement activities

Identify and address new governance issues as necessary

Governance
Data Partners and Data Users

Data Partners will:

- Retain organizational autonomy in providing access to their data
- Provide efficient stewardship of site and network data by leveraging resources
- Engender collaborative citizenship and leadership within CHORDS
- Strengthen and ensure compliance with site-specific, local, state and federal policies and regulations

Data Users will:

- Adhere to responsibilities for data access and use
- Enhance evidence-based health care and public health practice
- Foster innovative methods
- Assess population measures and discover generalizable knowledge for the public domain
- Encompass diverse perspectives: patient-centered, population-based, provider and health care delivery systems
- Maintain participating data partner confidentiality

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Why EHR data?

- ✓ Can be accessed in a timely manner
- ✓ May be used for repeated cross-sectional or longitudinal analysis
- ✓ **And most importantly…the data are geo-locatable**

EHR Data Pros and Cons

+ Volume and Coverage

+ Geo-location for Strong Small Area Functionality

+ Detailed Clinical Information

+ Naturally Longitudinal Record

+ Data Available Near Real-time

– Primary Use ≠ Secondary Use

– Care Seeking Population is Not Necessarily Representative

– Missing Data (demographic and geographic)

– Challenging to Access, Transform, Analyze, and Interpret

– Variation in Provider Workflow and Documentation Practices

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Challenges

- Recruiting busy healthcare orgs was challenging
- Healthcare providers have varied levels of technical expertise
- Combining data can introduce duplicates and bias
- Population Health stakeholders ≠ Health IT stakeholders
- Difficult to maintain open source software
- Interpreting EHR data at a population level is novel

Adult Depression in Denver

10.5% of Denver adults had a depression diagnosis in 2016.

Adult Depression in Denver
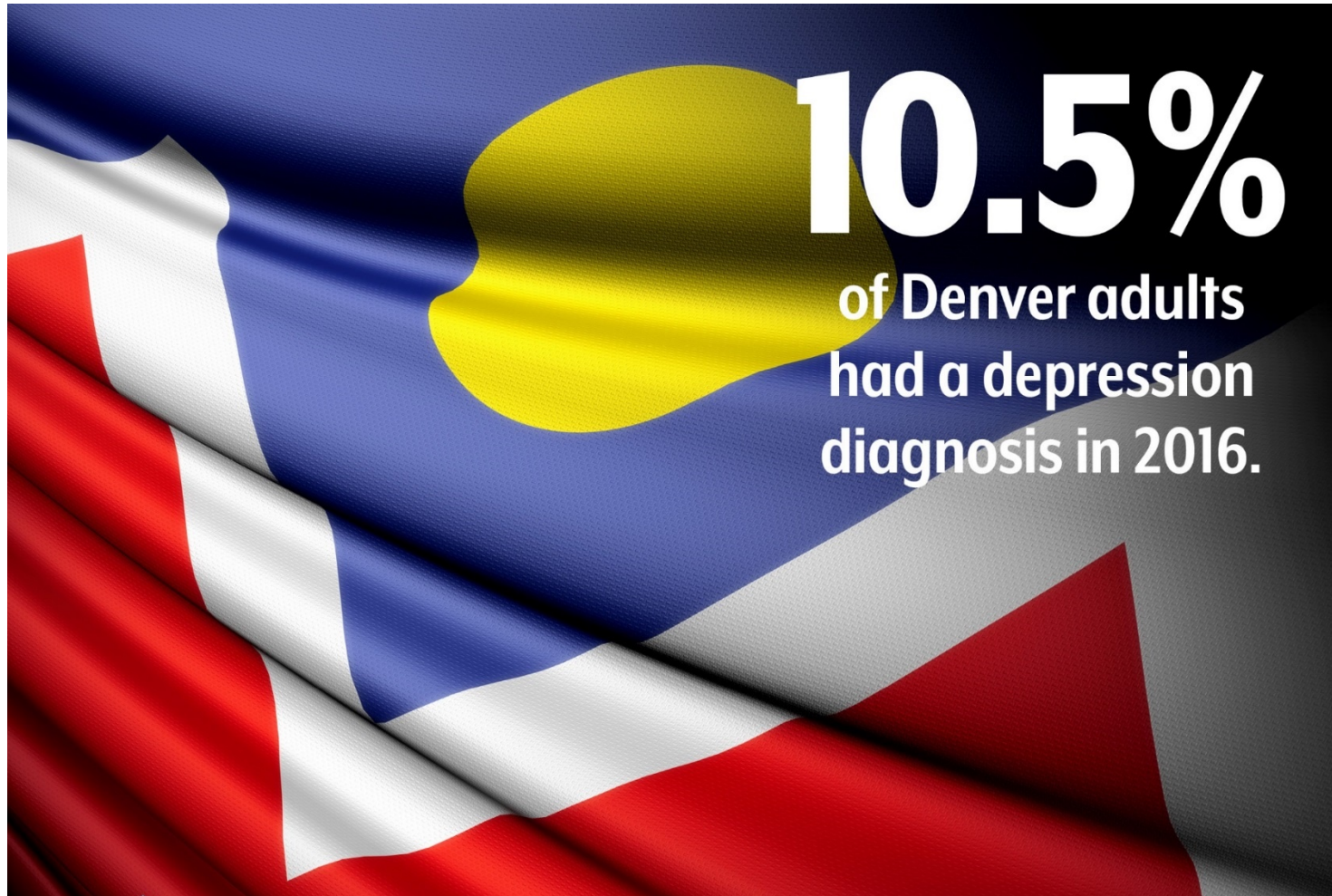
Adult Depression in Denver

Prevalence of Diagnosed Depression Among Latino Adults 35 Years and Older in Denver County, by Census Tract, 2015

Latino Prevalence
- ☐ Not Contributing Data
- ☐ 0-9.99%
- ■ 10-14.99%
- ■ 15-19.99%
- ■ 20% and Higher
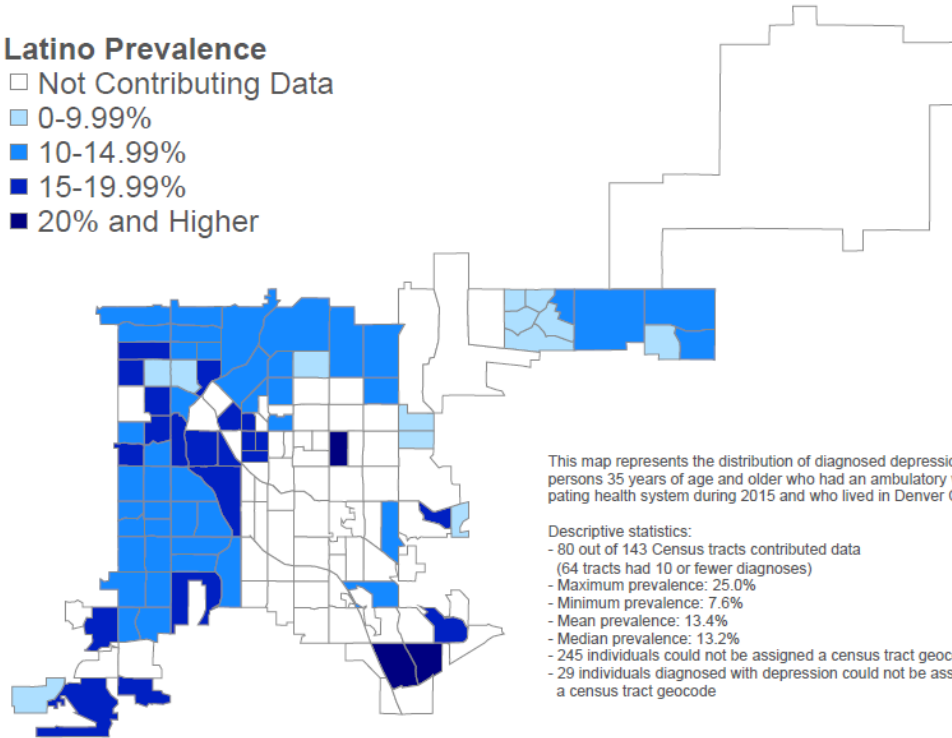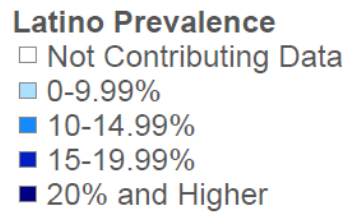
This map represents the distribution of diagnosed depression among Latino persons 35 years of age and older who had an ambulatory visit at a participating health system during 2015 and who lived in Denver County.

Descriptive statistics:
- 80 out of 143 Census tracts contributed data
  (64 tracts had 10 or fewer diagnoses)
- Maximum prevalence: 25.0%
- Minimum prevalence: 7.6%
- Mean prevalence: 13.4%
- Median prevalence: 13.2%
- 245 individuals could not be assigned a census tract geocode
- 29 individuals diagnosed with depression could not be assigned a census tract geocode

Data Source: Colorado Health Observation Regional Data Service (CHORDS)

CHORDS

CHORDS Depression Data

- Prevalence varied between 7% to 9% metro area
  - Hot spots at 16% prevalence
  - Cold spots at 4% prevalence
- Prevalence increased with age from 7% in 15-19 year olds to 16% in 65-69 year olds
- Depression twice as common in women compared to men (10% vs. 5%)

Census Tract Population Coverage

Coverage Category
- ☐ No Data
- ☐ 0-24.99%
- ■ 25-49.99%
- ■ 50-74.99%
- ■ 75-100%
- ■ >100%

Shows patient duplication challenge
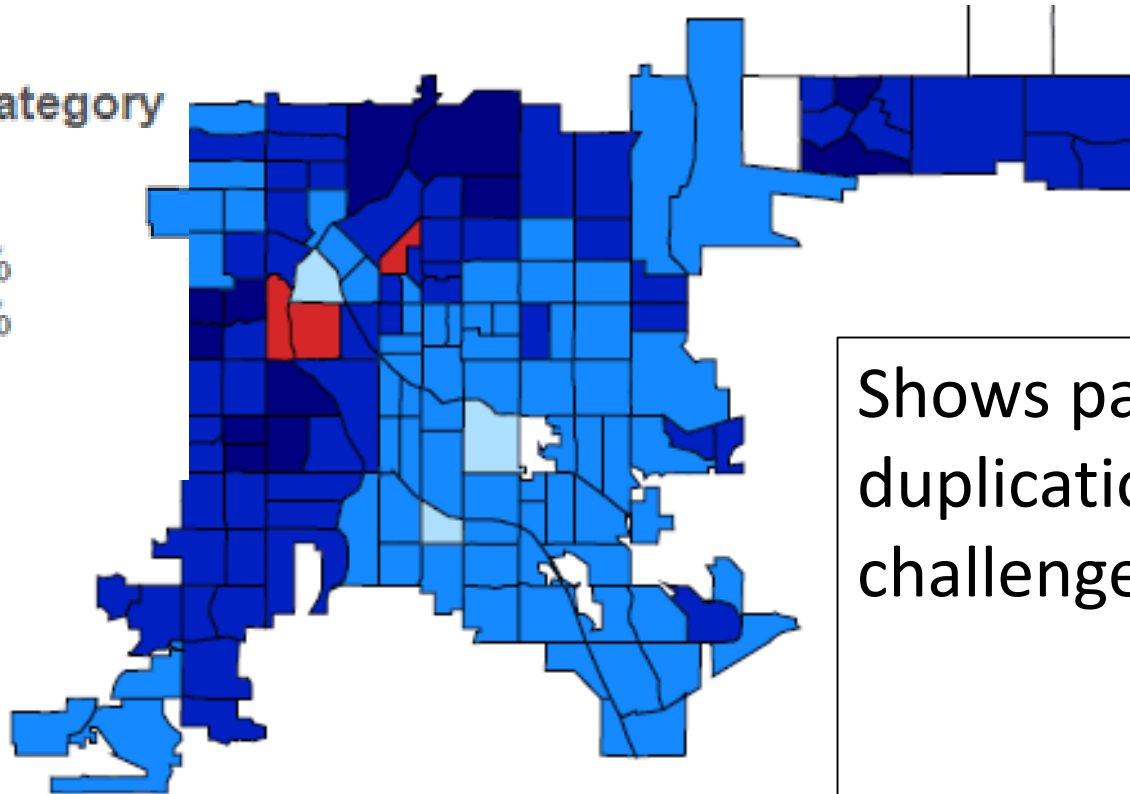
Challenges: De-Identification & De-Duplication

- Data must be aggregated across healthcare systems and **de-identified** to protect individual privacy - HIPAA regulations

- Data must be **de-duplicated** when merging patient data from multiple health organizations – avoids the patient being represented more than once in the analyses

Solution

- By partnering with local health information exchange, CORHIO, and using an enterprise Master Patient Index, patient information was unified across providers and de-duplicated.

- Alpha-numeric identifiers uniquely distinguish individuals in the virtual data warehouse

- As an example, when CORHIO compared data between two data partners, a duplication was discovered that they shared 8% of patients

2018 Outcomes

- 12 data partners now share data

- 5 public health agencies access that data

- Local instance of query software deployed

- Data partners built a datamart and configured software

- Approved as a specialized Meaningful Use registry in 2016

- Structured queries are available to estimate prevalence of depression, obesity, diabetes, opioids, and hypertension

- 47 queries have be submitted and provided data

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Questions

- Contact:
- Sara Schmitt at SchmittS@coloradohealthinstitute.org
- Kate Horle at Khorle@corhio.org