Learning health system linchpins: information exchange and a common data model

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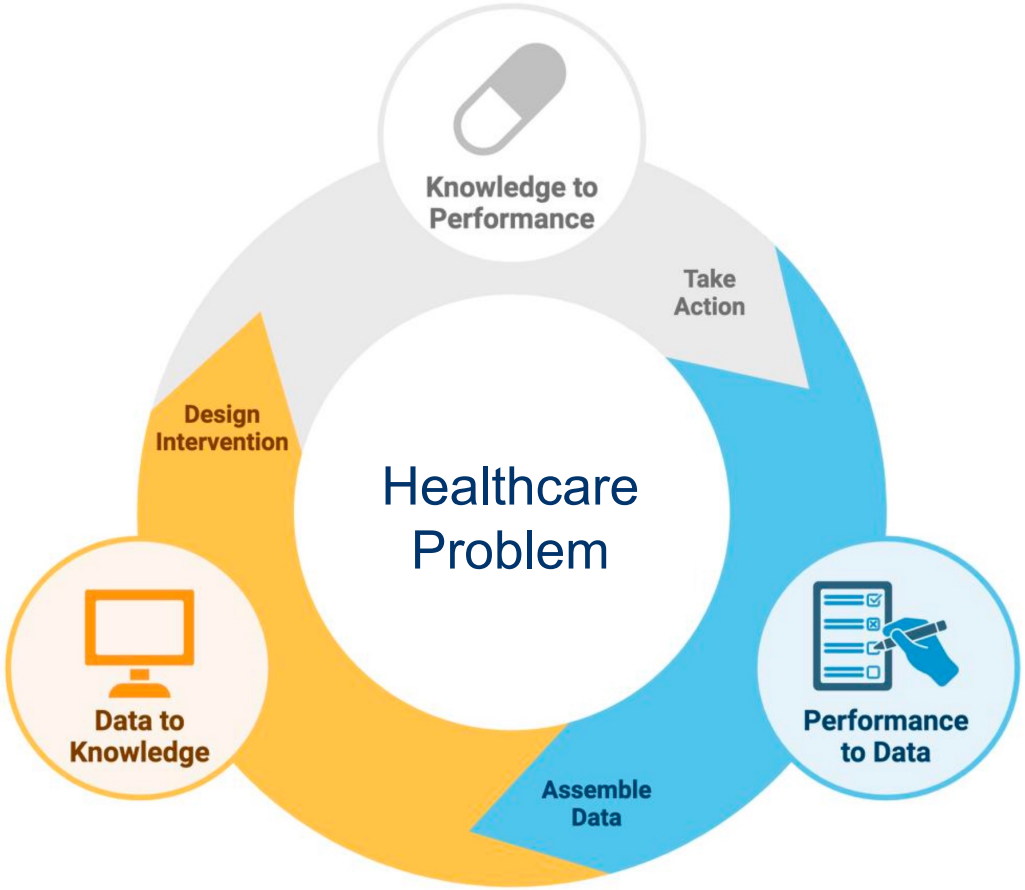
Background

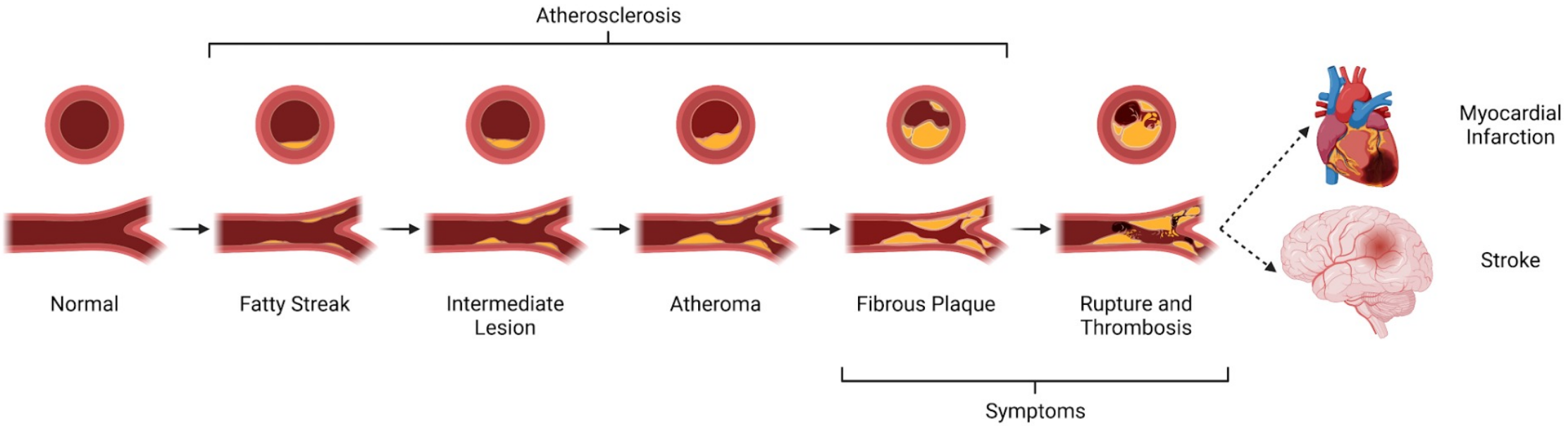
Learning Health Systems

- Continuous healthcare delivery improve
- Requires technology infrastructure
- Three phases
  1. Data to Knowledge
  2. Knowledge to Performance
  3. Performance to Data
- Electronic Health Record as P2D captur



Background

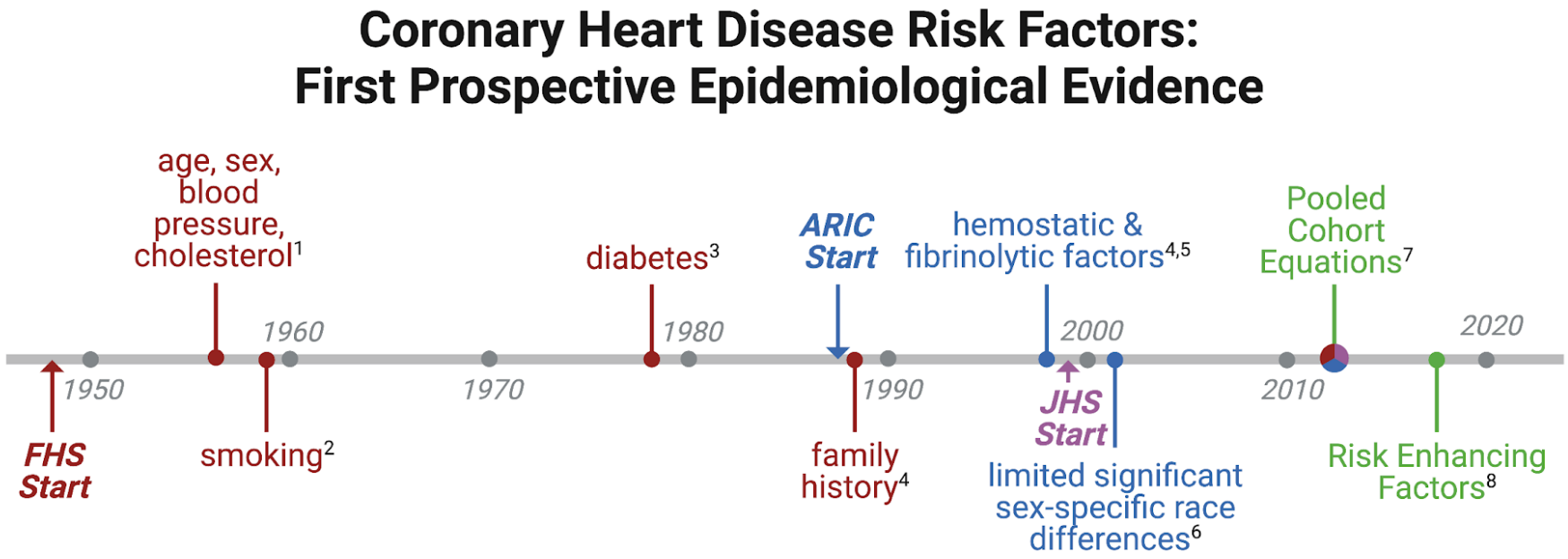
Progression of Atherosclerosis



"ASCVD" = Atherosclerotic Cardiovascular Disease
ASCVD Event = Myocardial Infarction or Stroke

Background

Coronary Heart Disease Risk Factors

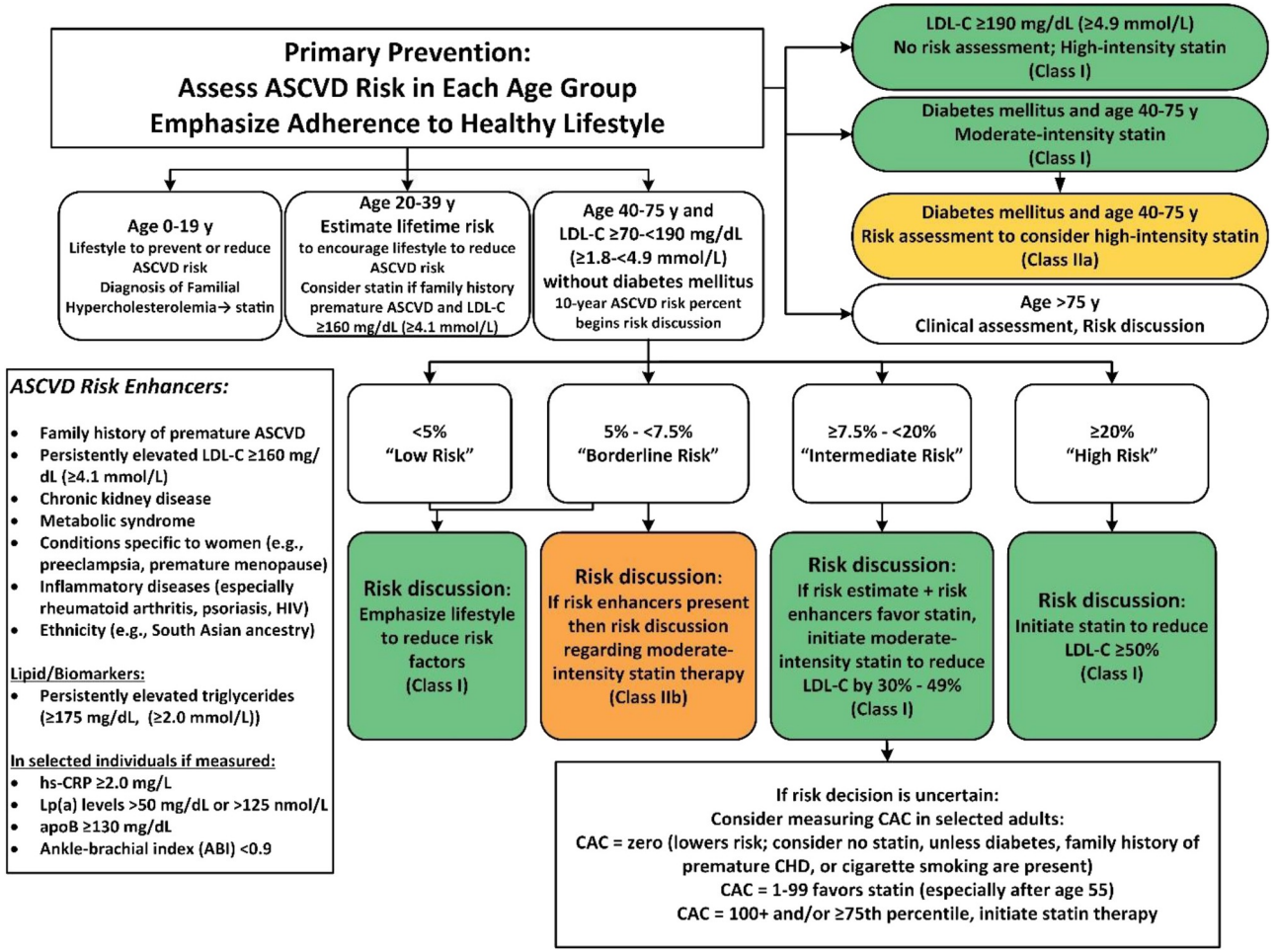


Framingham Heart Study (FHS)
Atherosclerosis Risk in Communities (ARIC) Study
Jackson Heart Study (JHS)
American Heart Association &
American College of Cardiology Risk Based Cholesterol Guidelines

[1]Dawber et al, 1957
[2]Dawber et al, 1959
[3]Kannel and McGee, 1979
[4]Schildkraut et al, 1989
[5]Folsom et al, 1997
[6]Folsom et al, 2001
[7]Goff et al, 2014
[8]Grundy et al, 2019

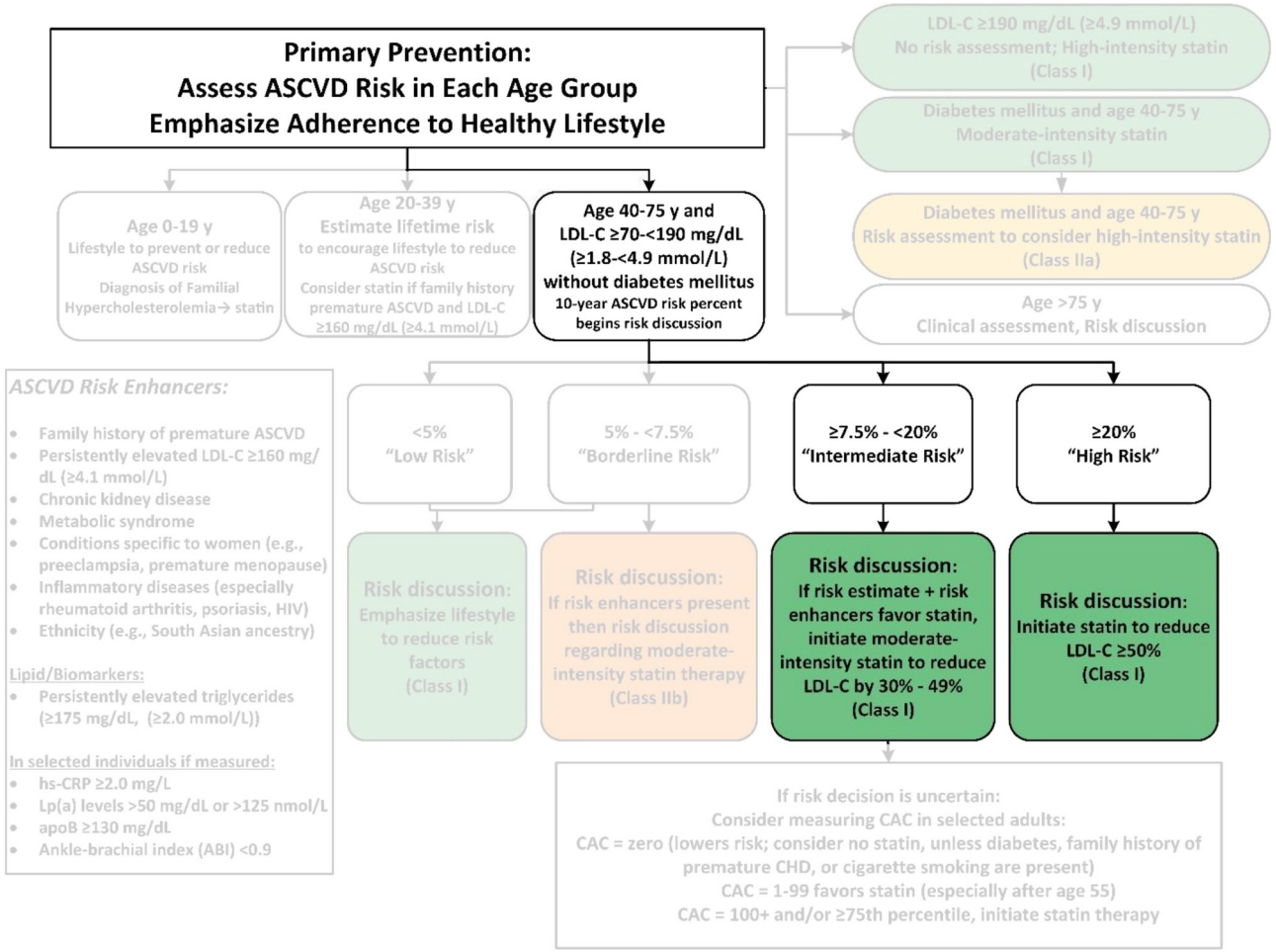
Background

2018 Cholesterol Guidelines



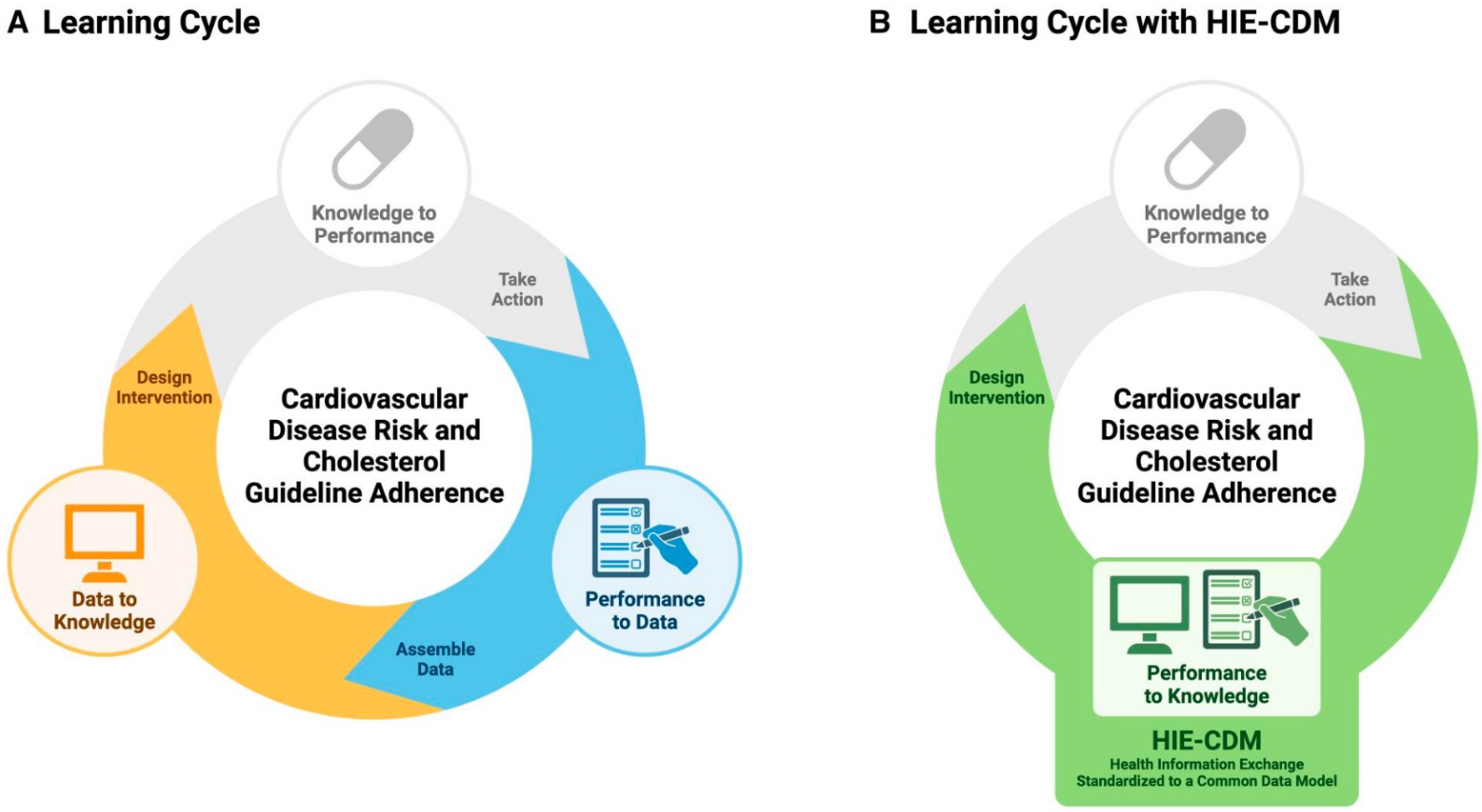
Background

2018 Cholesterol Guidelines



Background

Objective



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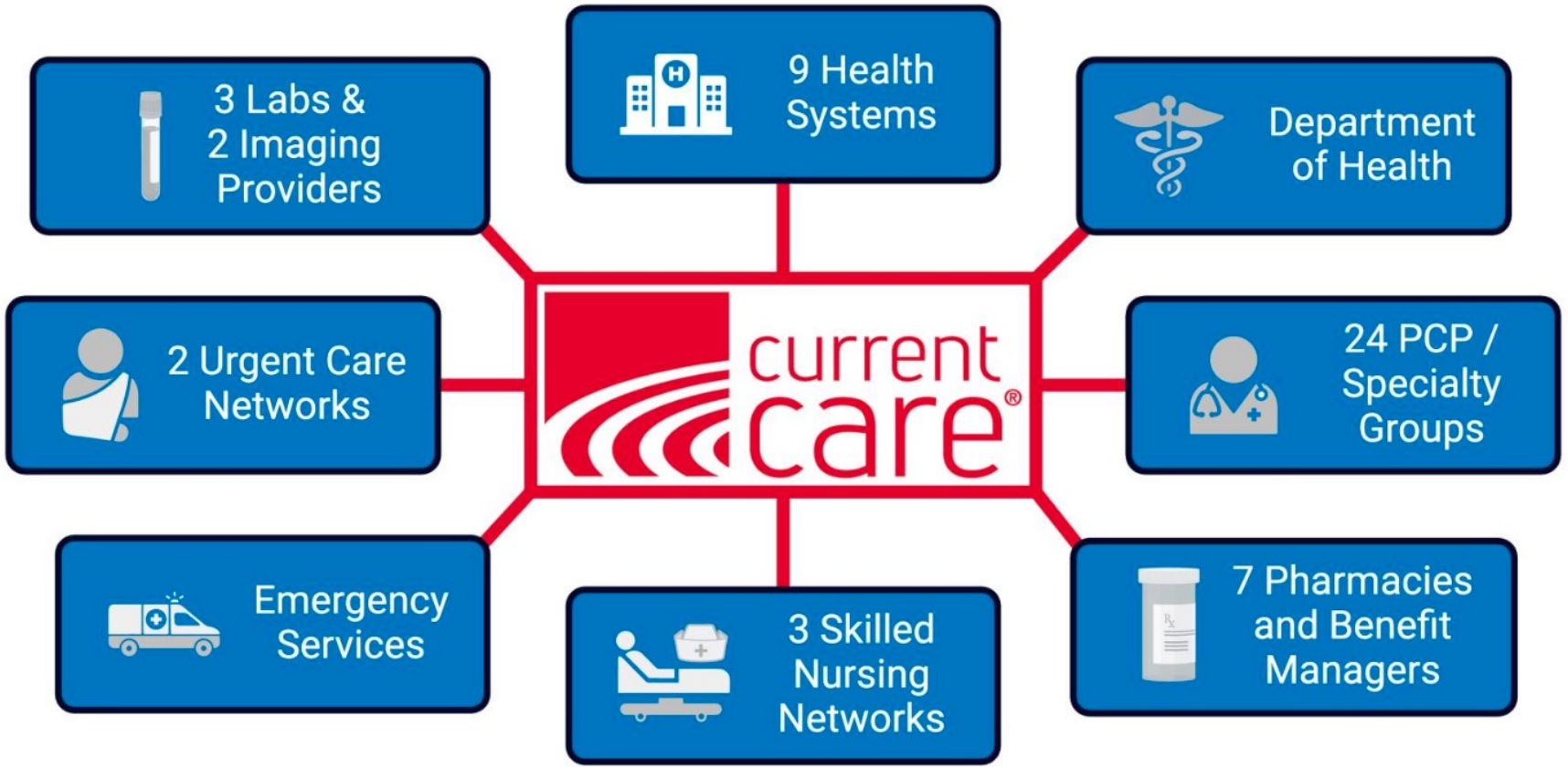
Methods

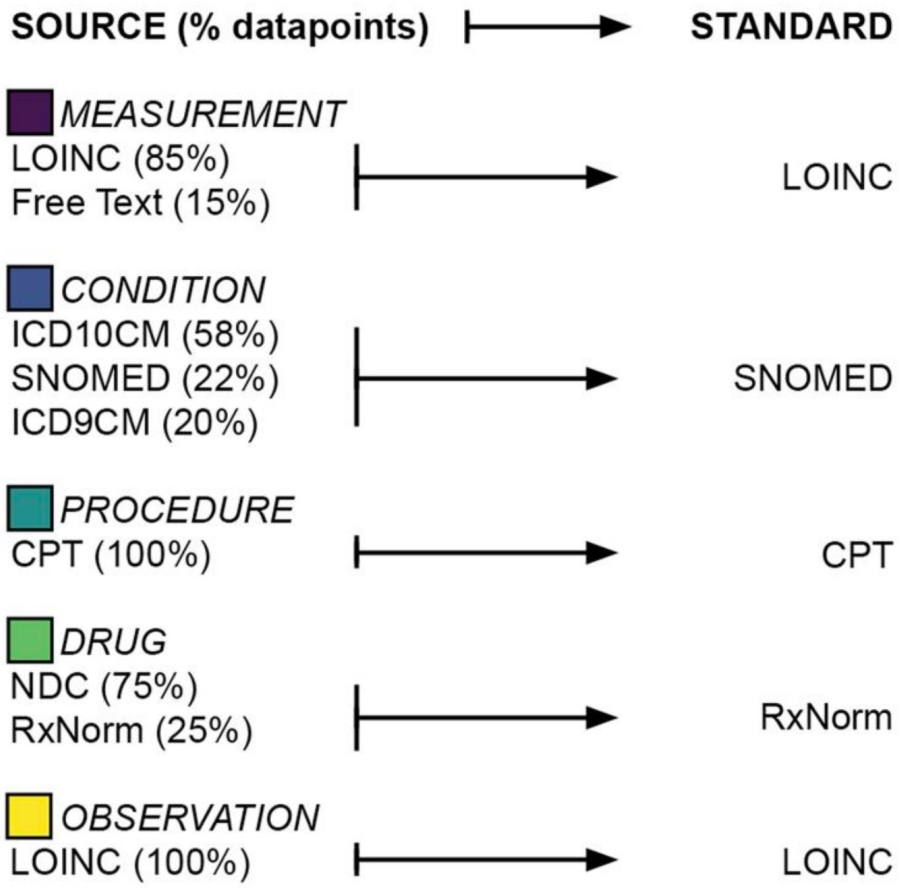
Rhode Island Health Information Exchange



Methods

Vocabulary mapping

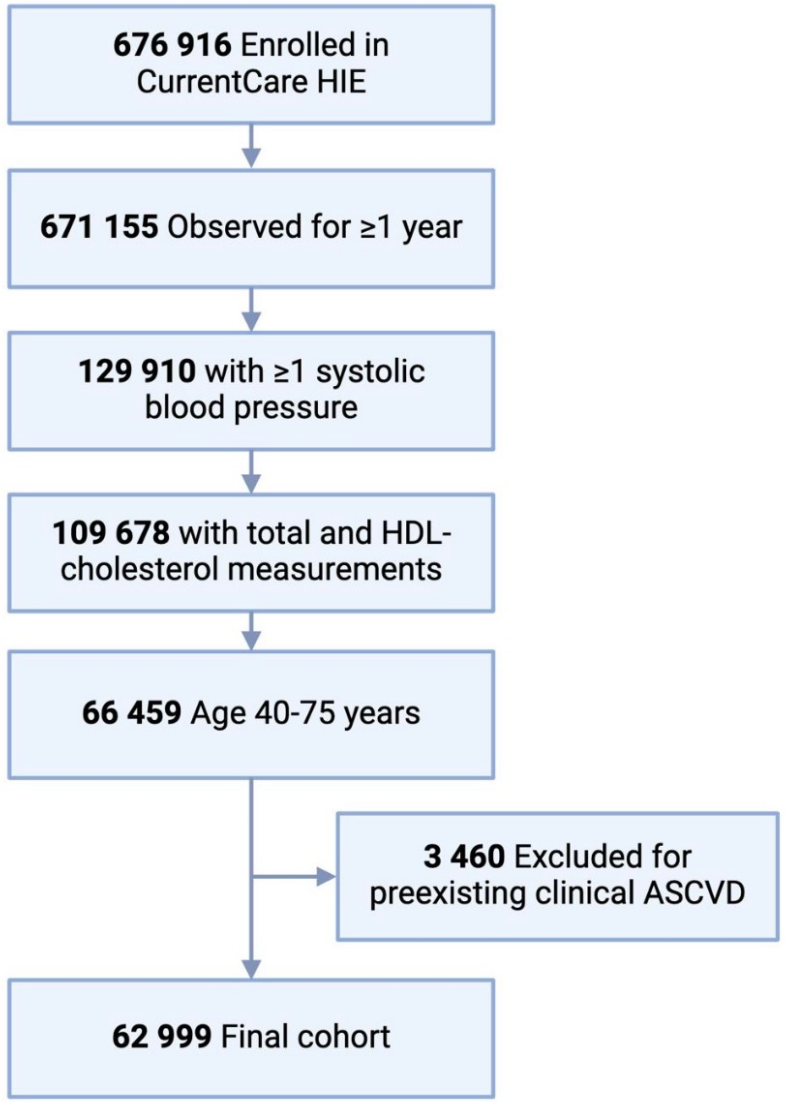
- OHDSI source-to-standard SQL
  - >99% of problems, diagnoses, drugs, and observations
- OHDSI Usagi
  - 1000 most common measurements
- Most remaining unmapped raw data were unintelligible (e.g., test performed)
- OHDSI Data Quality Dashboard and ATLAS to assess data quality



Methods

Cohort Inclusion Criteria

- Enrolled in the HIE with an observation period of at least 1 year
- Have minimum required data within the HIE to calculate 10-year ASCVD risk
- Age within range of ASCVD risk-based statin recommendation guidelines
- No evidence of ASCVD prior to observation start date



Results

Data Dimensionality Reduction with OMOP

Ex: Dyspnea (5-to-1 Source-to-Standard)

ICD10CM: Shortness of Breath (37%)
ICD9CM: Shortness of Breath (22%)
ICD10CM: Dyspnea, unspecified (17%)
SNOMED: Dyspnea (16%)
ICD10CM: Other forms of dyspnea (9%)

} Dyspnea SNOMED

Results

Data Dimensionality Reduction with OMOP

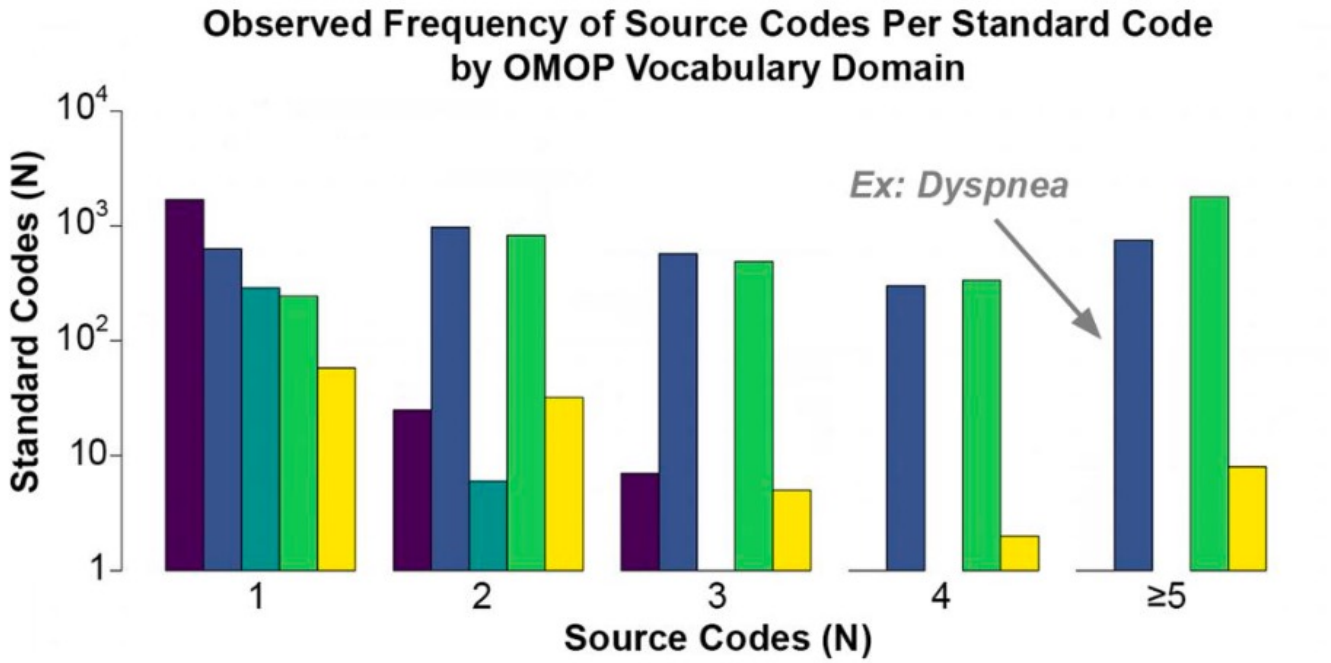
MEASUREMENT
LOINC (85%)
Free Text (15%)

CONDITION
ICD10CM (58%)
SNOMED (22%)
ICD9CM (20%)

PROCEDURE
CPT (100%)

DRUG
NDC (75%)
RxNorm (25%)

OBSERVATION
LOINC (100%)



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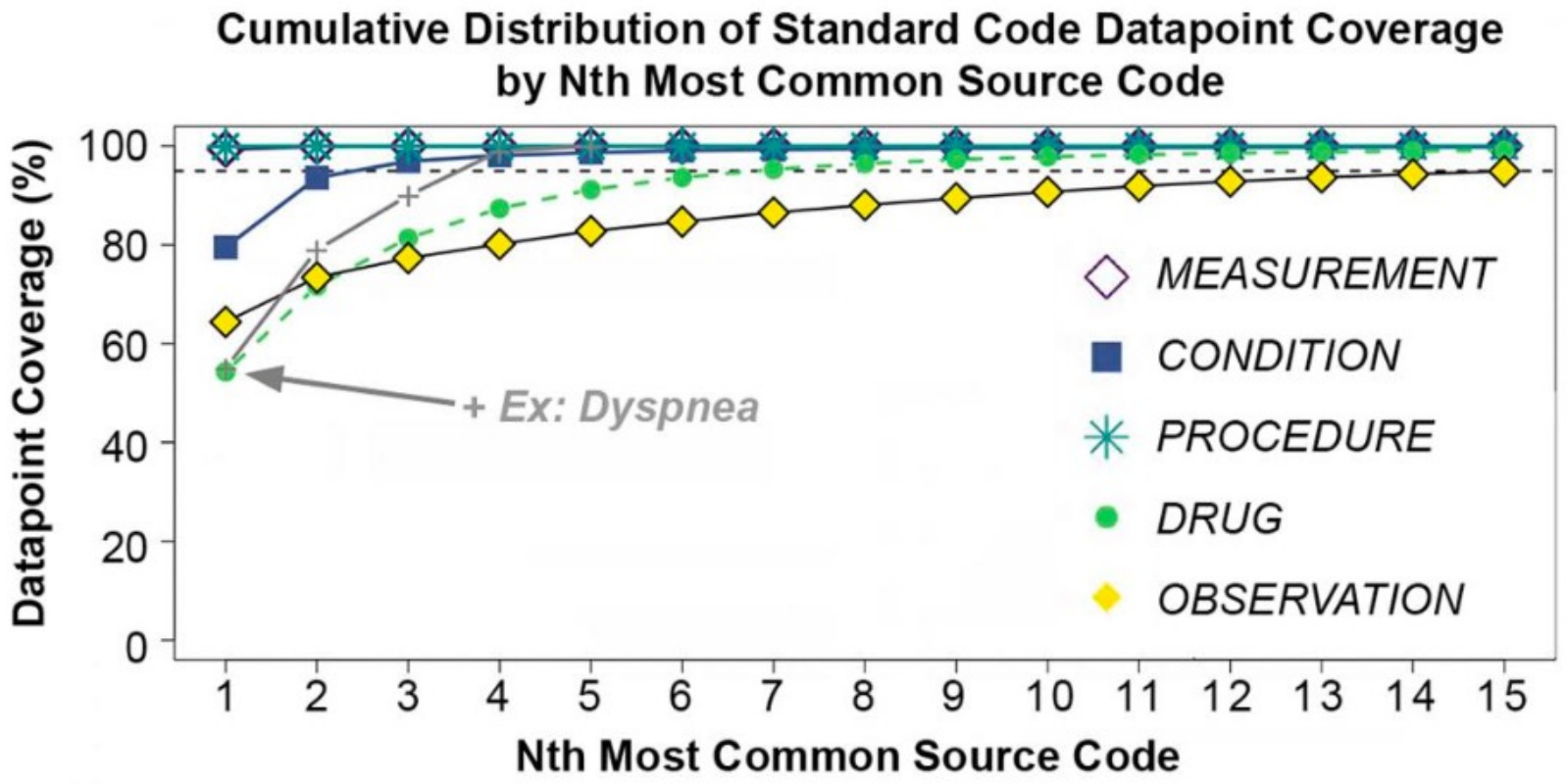
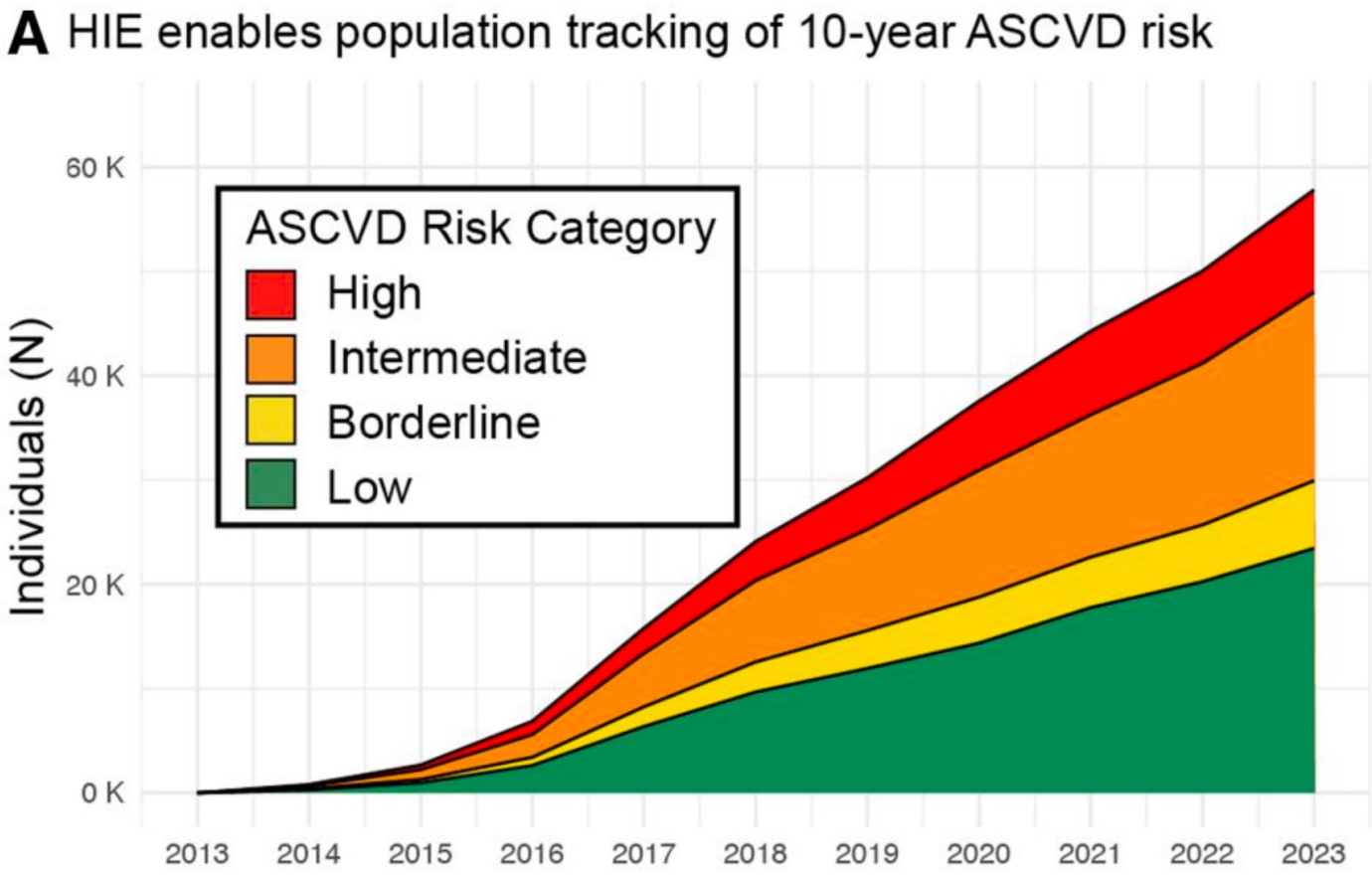
Results

Data Dimensionality Reduction with OMOP



Results

Population ASCVD Risk Tracking



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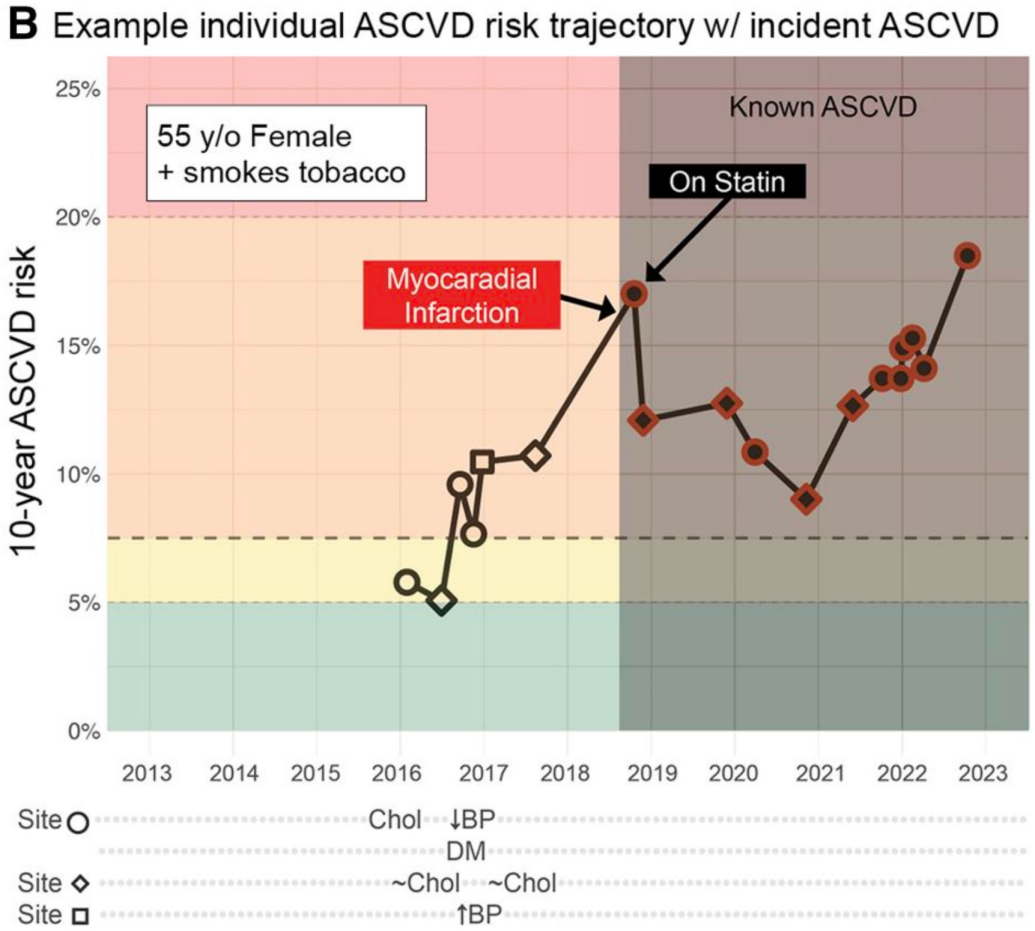
Results

Individual ASCVD risk trajectory



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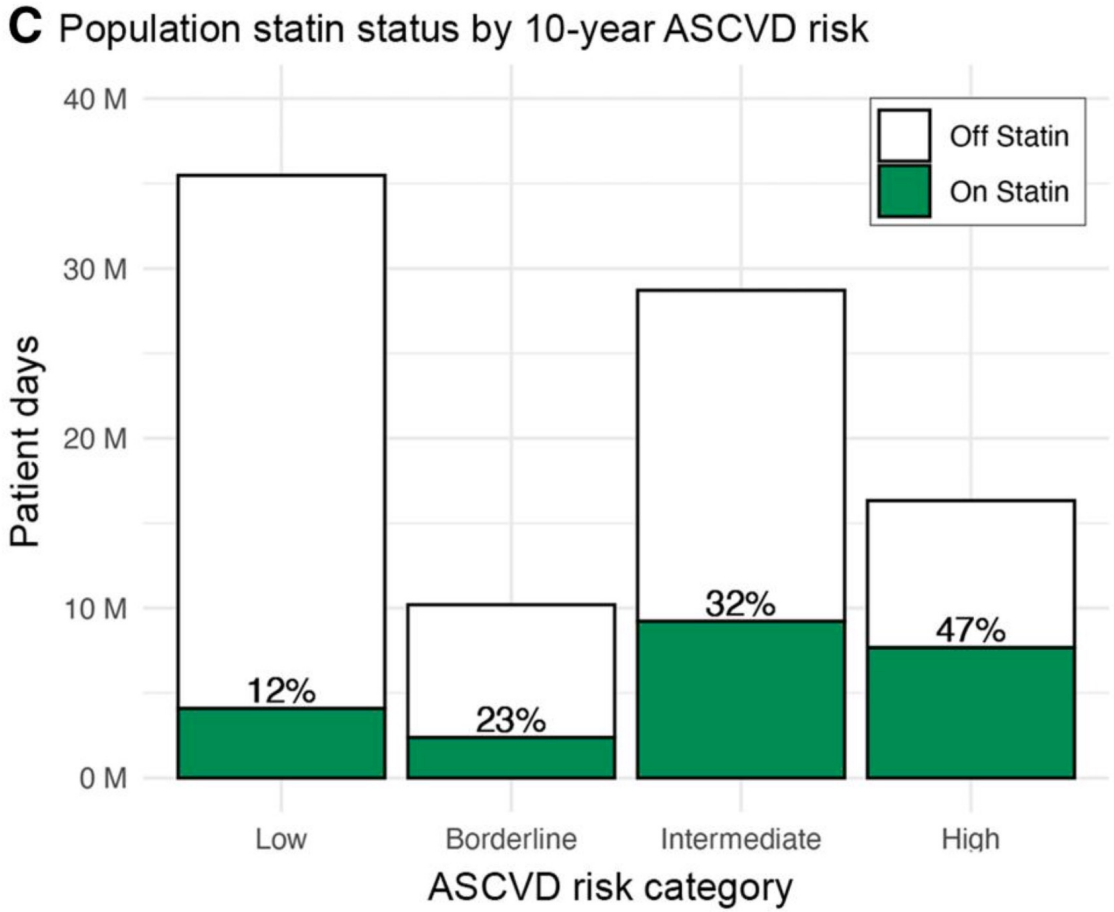
Results

Statin guideline adherence



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Results

Statin guideline adherence disparities

- Health Systems vs. Federally Qualified Health Centers (FQHC)
- FQHC Patients
  - Demographics: Younger, more Female, more likely to identify as Black
  - Unfavorable: (adj for age/sex): blood pressure, cholesterol, diabetes, tobacco use
  - At the intersection of race and ethnicity, FQHC patients had unfavorable adjusted risk factors
  - FQHC patients spent more days at **intermediate** and **high** risk compared to patients of health systems and were **MORE likely** to be on a statin

Discussion

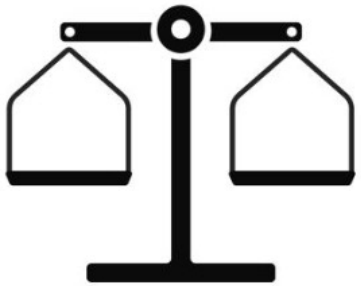
HIE-CDM powers population level performance-to-knowledge

A **Individual Statin Recommendations**

A **62 year old Female** smoker with elevated cholesterol and blood pressure **should start statin** therapy.

B **Health System Equity Monitoring**

Male and **Female** patients seen at a large **FQHC** with known diabetes are ***equally*** likely to be **on statin** therapy.



C **Population Primary Prevention Metrics**

45% of **ASCVD events** observed in 2022 were in **high risk** patients **NOT** on **statin** therapy.

Acknowledgements

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Research and Applications

Research and Applications

Learning health system linchpins: information exchange and a common data model

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Thank you!

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