The Potential for Research Using Electronic Medical Records in Ontario

University of Toronto Summer Workshop on Big Data for Health

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Faculty/Presenter Disclosure

- **Faculty: Rick Glazier**

- **Relationships with commercial interests:**
  - **Grants/Research Support:** none
  - **Speakers Bureau/Honoraria:** none
  - **Consulting Fees:** none
  - **Other:** none

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Potential for conflict(s) of interest:

- **Rick Glazier** has received **N/A** from **N/A**
- **N/A** a product that will be discussed in this program: **N/A**

Mitigating Potential Bias

- Mitigation N/A

Topics

- Growth of EMR use
- EMR extraction systems in Ontario
  - current state
  - future state
- Linkages with other data holdings
- Importing, accessing data

Growth of EMR Use

- Rapid adoption in past few years
- Now approximately 70% of GP/FPs and 25% of specialists
- More than a dozen vendors
- Not all use is full or meaningful
- Most still receive reams of paper
  - not directly linked with hospitals, specialists, pharmacies, homecare, each other
  - few linked with pharmacies

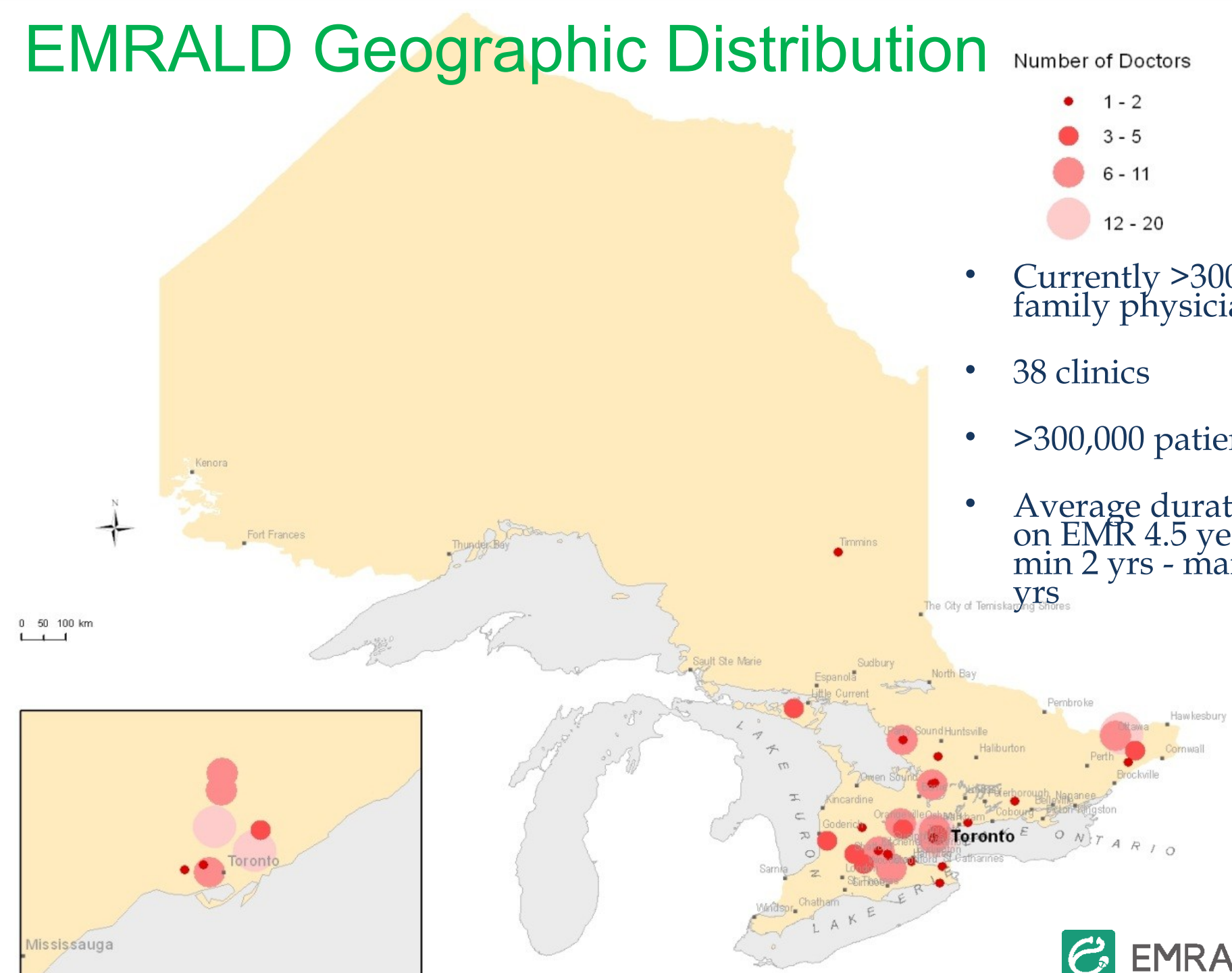
EMR Extraction Systems in Ontario: Current

EMRALD = Electronic Medical Record Administrative Data Linked Database
CPCSSSN = Canadian Primary Care Sentinel Surveillance Network

	EMRALD	CPCSSN
physicians	350	201
patients	400,000	301,000
vendors	1	12
problem list	yes	yes
medications	yes	yes
allergies	yes	yes
BP, wt, ht	yes	yes
habits	yes	yes
lab results	yes	yes
progress notes	yes	no
specialist letters	yes	no
scanned files	yes	no

Data 'safe haven' being developed to house, clean and combine data from both systems

EMRALD Geographic Distribution



- Currently >300 family physicians
- 38 clinics
- >300,000 patients
- Average duration on EMR 4.5 years, min 2 yrs - max 25 yrs

EMRALD

EMR and administrative data fields contained in EMRALD by degree of structure

Structured

- Laboratory tests
- Blood pressures
- Anthropometric measures
- Physician billings
- Date of birth
- Gender
- Postal code
- *Health card number**
- *Physician billings in OHIP***
- *Hospitalizations in CIHI***
- *Medications dispensed in ODB***
- *Emergency room visits in NACRS***
- *Diagnostic tests in OHIP***
- *Laboratory tests in OHIP***
- *Procedures in OHIP***

Semi-Structured

- Cumulative Patient Profile
- Medications
- *Reminders**

Unstructured

- Cumulative Patient Profile
- *Physician visits**
- *Consultation letters**
- *Referral letters**
- *Diagnostic tests**
- *Hospital discharge summaries**
- *Emergency room visits**

OHIP: Ontario Hospital Insurance Plan
CIHI: Canadian Institute for Health Information
NACRS: National Ambulatory Care Reporting System
ODB: Ontario Drug Benefit

**Fields unique to EMRALD not usually contained in other EMR databases in Canada and internationally*

***Fields unique to EMRALD because linkable to the administrative data holdings at ICES*

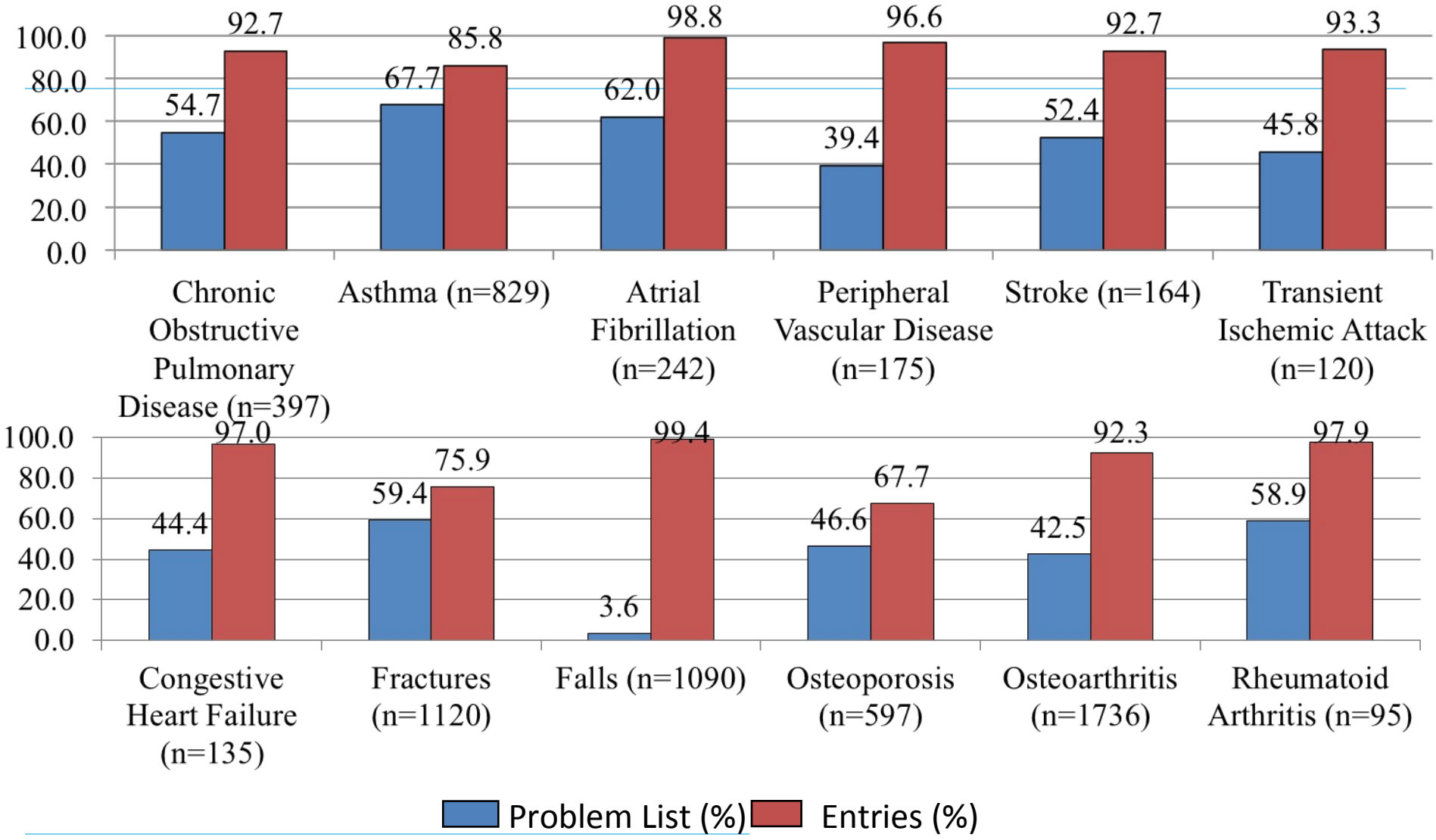
Identifying patients with HTN with Admin Data vs Text Mining vs Automated Search

Database	Sensitivity	Specificity	PPV	NPV
2 OHIP in 2 years or 1 CIHI	72.6%	93.1%	79.3%	90.3%
Text Miner	86.9%	97.0%	91.5%	95.3%
CPP or CHEP or Rx and ↑bp on the same day	83.3%	99.5%	98.9%	93.2%

Reference Standard is EMR abstraction (N=969 adults age 20 and over), prevalence of hypertension 26.7%

2 OHIP in 2 yrs or 1 CIHI vs. chart abstraction (N=1676), adults age 35+ prevalence of 32%
Sensitivity 72%, Specificity 95%, PPV 87%, NPV 88%

Where disease conditions are recorded in the EMR



Who we are

British Columbia
BCPCReN, *Vancouver*
Alberta
SAPCReN, Calgary
AFPRN, Edmonton
Manitoba
MaPCReN, Winnipeg

Ontario
DELPHI, London
UTOPIAN, Toronto
EON, Kingston
Quebec
RRSPUM-Réseau de recherche en soins primaires de l'Université de Montréal
Nova Scotia/New Brunswick
MaRNet, Halifax
Newfoundland
APBRN, St. John's

8 provinces and 1 territory, 10 PBRNs using 12 EMRs
500 practices and 600,000 patients across Canada

Ontario

Ontario
DELPHI, London
UTOPIAN, Toronto
EON, Kingston

201 primary care practitioners
301,000 patients

CPCSSN Background

PURPOSE

1. **Develop** an infrastructure for CPCSSN that will underpin the operations of a robust, longitudinal data collection and maintenance of a primary care data repository on chronic disease
2. **Demonstrate** the ability to extract relevant data from multiple EMRs at multiple primary care practice sites
3. **Develop** a representative sentinel surveillance network of family practices to montior chronic disease in Canada
4. **Create** a usable database that will be a searchable data repository for government, primary care researchers and others in Canada

CPCSSN Data

- Provider profile
- Patient socio-demographics
- Disease/ health condition
- Encounter data
- Risk factor data
- Examination data
- Medications
- Laboratory data
- Referral data
- Procedure data

Chronic Diseases

- Chronic Obstructive Lung Disease
- Depression
- Diabetes
- Hypertension
- Osteoarthritis

- Dementia
- Epilepsy
- Parkinson's Disease

- Other diseases in the future

EMR Extraction Systems in Ontario: Future

- OMA Insights4Care proposal to extract all EMR data in Ontario
- Clean, organize and feedback
- Primary use – to improve clinical practice
- Secondary use - includes research

Linkages with Other Data Holdings

- EMRALD and CPCSSN both linked at ICES
- Rich array of linked data holdings
  - health care use
  - validated disease registries
  - disease prevention and management
  - immigration, ethnicity
  - social, education, transportation data
  - environmental data – air pollution, walkability, food

Importing, Accessing Data

- External datasets routinely brought to ICES
- Health card number used for linking
  - can be done using name, date of birth, address
- Consent depends on REB
  - often not required if impractical (existing dataset)
  - usually needed for new data collection
- Data sharing agreements needed
- Possible to approach physicians in EMRALD/CPCSSN for patient recruitment
- Access data through ICES scientists or Data & Analytic Services (VPN)

Comments, Questions?