Exploring PHC EMR data and its impact on population clinical profiles

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Inputs → POP Grouper → Outputs

Inputs
- Hospital care
- Ambulatory care
- Residential care
- Community care

Outputs

Comprehensive clinical profile

Information on 226 health conditions, the associated health profile group and functional status

Predictive indicators
- Cost weights
- Number of primary care visits
- Number of emergency department visits
- Probability of admission to long-term care
- Risk of hospitalization for pneumonia

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Project goal

- Multiple data sources are used to create clinical profiles in POP Grouper, - to what extent does adding PHC EMR data improve population clinical profiles?

- To explore effect of client-level Social Determinants of Health (SDOH) on POP Grouper cost models

Inpatient
ICD-10-CA

Ambulatory
ICD-10-CA

Long-term Care
RAI-MDS 2.0

Home Care
RAI-HC

Physician visits
ICD-9

+

PHC EMR
ICD-10

?

What is the impact?

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Population data in POP Grouper

- **Population** (*n=14,987,397)*: Ontario residents eligible for public funded health services in FY2015/16 and FY2016/17 (i.e., 2-year window to build POP clinical profiles)

- **Clinical data**: inpatient stays, day surgeries, ED visits, primary care physician visits, long-term care (LTC) and home care services in the same 2-year window

- **Cost data**: inpatient stays, day surgeries, ED visits, primary care physician visits and LTC services in the same 2-year window and 1 year into future

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PHC EMR data to be explored

**PHC EMR data**

- PHC EMR data is collected from the 73 Community Health Centres (CHCs) in Ontario, which are not-for-profit, interprofessional, community-based primary health care organizations partnered with the ***Alliance for Healthier Communities***

- Data covers client-level demographic, administrative, service, clinical, and SDOH information

- Diagnostic information available via ICD-10 codes

CHC clients linked to POP Grouper

Sub-population (***n=306,899***) of Ontario residents who visited a CHC in FY2015&16 with diagnoses recorded in EMR
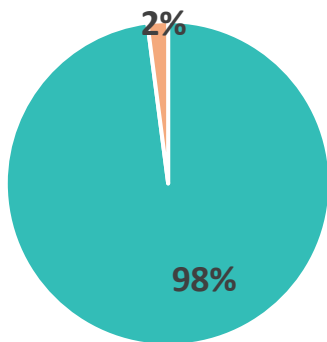
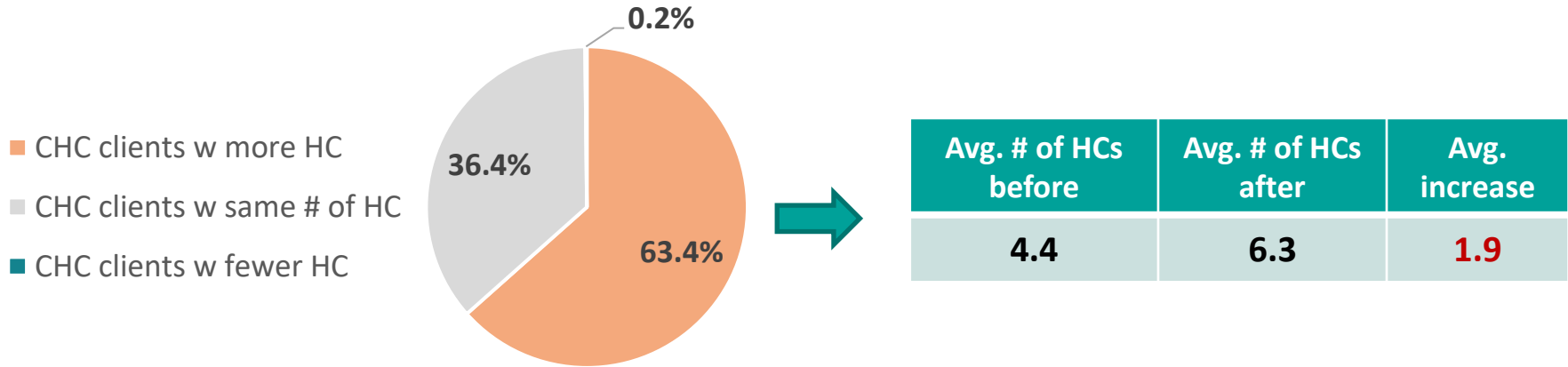- POP population without EMR data
- POP population with EMR data
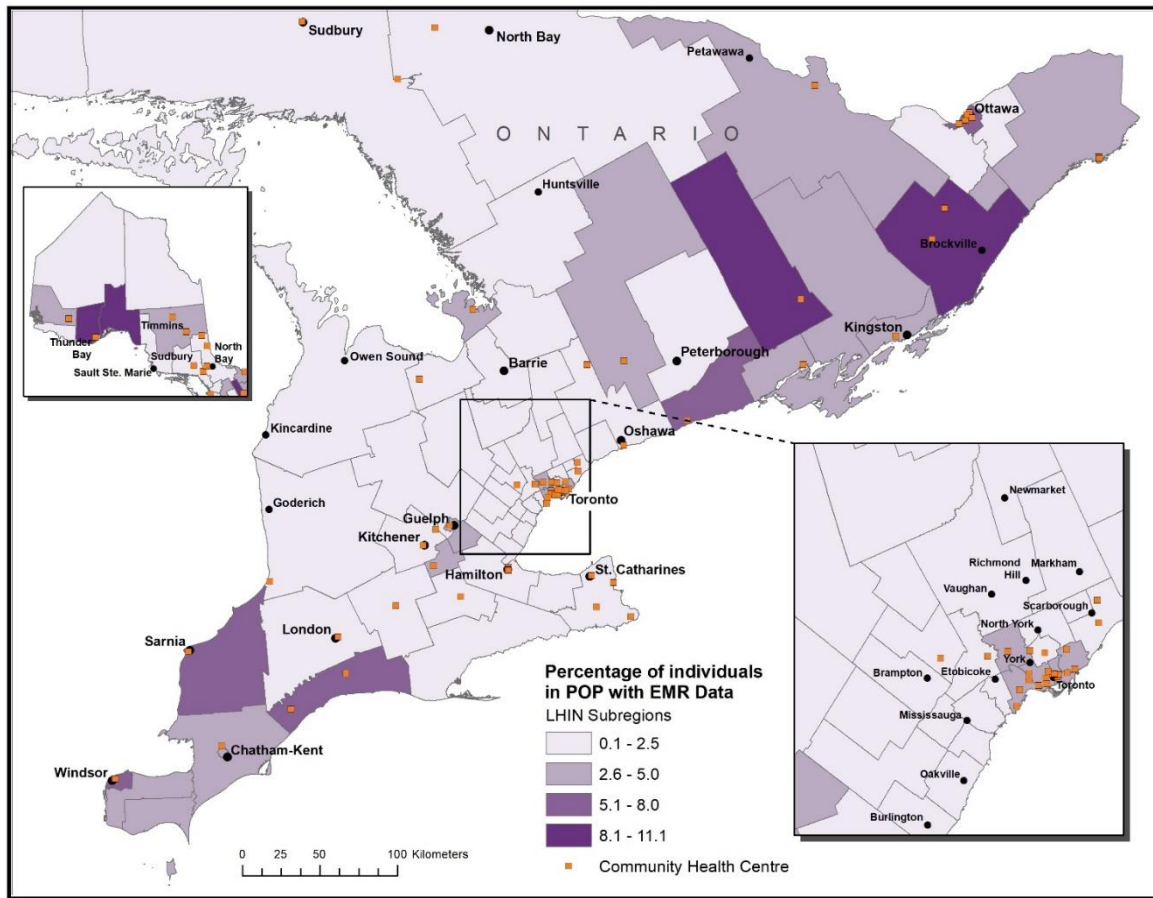
Impact of adding EMR data to building clinical profiles

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EMR data helps identify more health conditions (HC) for individuals

0.2%

36.4%

63.4%

- ■ CHC clients w more HC
- ■ CHC clients w same # of HC
- ■ CHC clients w fewer HC

Avg. # of HCs before	Avg. # of HCs after	Avg. increase
4.4	6.3	1.9

Finding:

- **After adding EMR data, over 60% of CHC clients now have more health conditions in their clinical profile**

- **EMR data adds about 2 (43%) new HCs to individuals health profile**

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Adding PHC EMR data changes individuals' dominant health condition

- **37%** of CHC clients changed their dominant HC

- **84%** of CHC clients with no HCs now have a dominant HC

- **60%** of CHC clients who were non-users before adding EMR data now have a dominant HC

* Adding PHC EMR data increases CHC clients cost weight by **28%**

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CHC data complements regional comparisons

	Before adding EMR			After adding EMR		
	Thunder Bay	**Rainy River**	**Difference**	**Thunder Bay**	**Rainy River**	**Difference**
Avg. # of HCs	3.4	3.2	0.2	3.5	3.2	0.3
Population cost weight (FY15&16)	1.21	1.29	**0.08**	1.25	1.29	**0.04**
Population cost weight (FY17)	1.08	1.13	**0.05**	1.12	1.13	**0.01**

Finding:

- **After adding PHC EMR data the estimated population cost weights get closer between the 2 regions**
- **Adding PHC EMR data provides a more accurate picture of regional differences**

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Explore effect of person-level SDOH on POP Grouper predictive cost models

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POP Grouper predictive cost models

Beyond predicting risk of LTC admission, number of ED and physician visits, POP Grouper also predicts healthcare costs:

- **Statistical models:** multi-variate linear regression

- **Response variable:** healthcare cost (inpatient stays, day surgeries, LTC, physician visits) for 2-year studying period and 1 year into future, respectively

- **Current predictors:**

  - age, sex, 226 health conditions, 2-way health condition interactions, number of health conditions, LTC ADL score

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Adding CHC SDOH as predictors to POP Grouper cost models

SDOH	Response rate	Risk factor
Language	98%	Speaking non-official language (EN, FR), 2%
Education level	64%	Below post secondary, 54%
Household composition (e.g., single parent, parents w/wo children, extended family, sole member)	65%	Living alone, 22%
Household income	60%	Low income (Statistics Canada Low Income Measure including family size) , 68%
Racial/ethnic group	20%	Not white (north American/European white), 40%

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Work to date and key preliminary findings

- Tested each of the 5 SDOH measures independently

- While some individual SDOH variables are significant in the regression models, their impact to the overall performance of the model is marginal (e.g., slight increase in R^2, less bias in selected models)

  - Education and household income seemed to be significant when predicting for 2-year studying period and 1 year into future

  - Language and household composition seemed to be significant when predicting 1 year into future

  - Racial/ethnic group seemed to be insignificant for either period

- Work to understand the full impact once SDOH variables are combined within the model are still underway

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Project summary

- It is feasible to incorporate the PHC EMR data into the POP Grouper

- The PHC EMR data complements individuals health data thus enhances their clinical profiles by providing a more complete and accurate picture of their needs

- The PHC EMR data is also important for regional comparison and facilitates a more fulsome understanding of regional health needs

- The PHC EMR data could help to enhance resource and service planning by identifying individuals health needs that were not captured elsewhere

- The SDOH information adds valuable sociodemographic aspect to the clinically focused POP Grouper. The study will continue to be refined as more SDOH data becomes available to CIHI

CIHI