

CIHI Population Grouping Methodology

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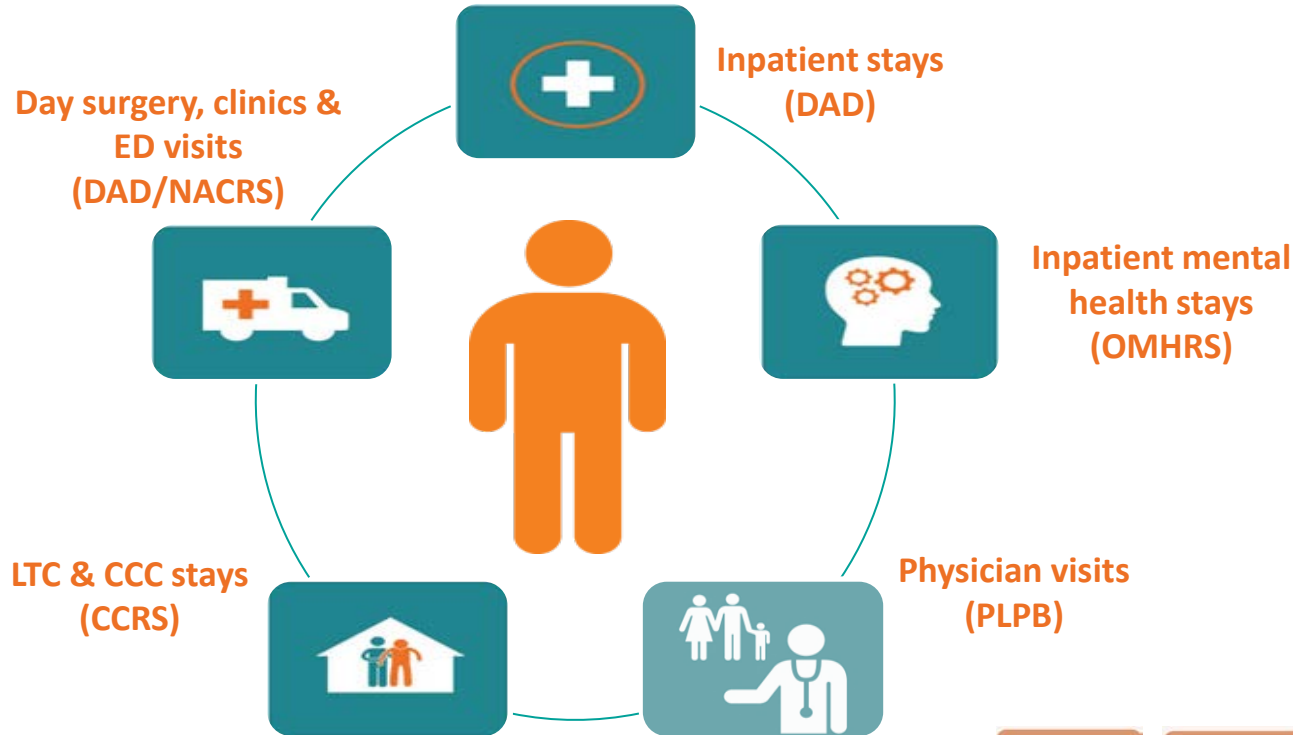
Disclosure

I have no actual or potential conflict of interest in relation to this topic or presentation



Population Grouping Methodology

CIHI's population grouping methodology



Pop grouper vs. other CIHI case-mix products

Similarities

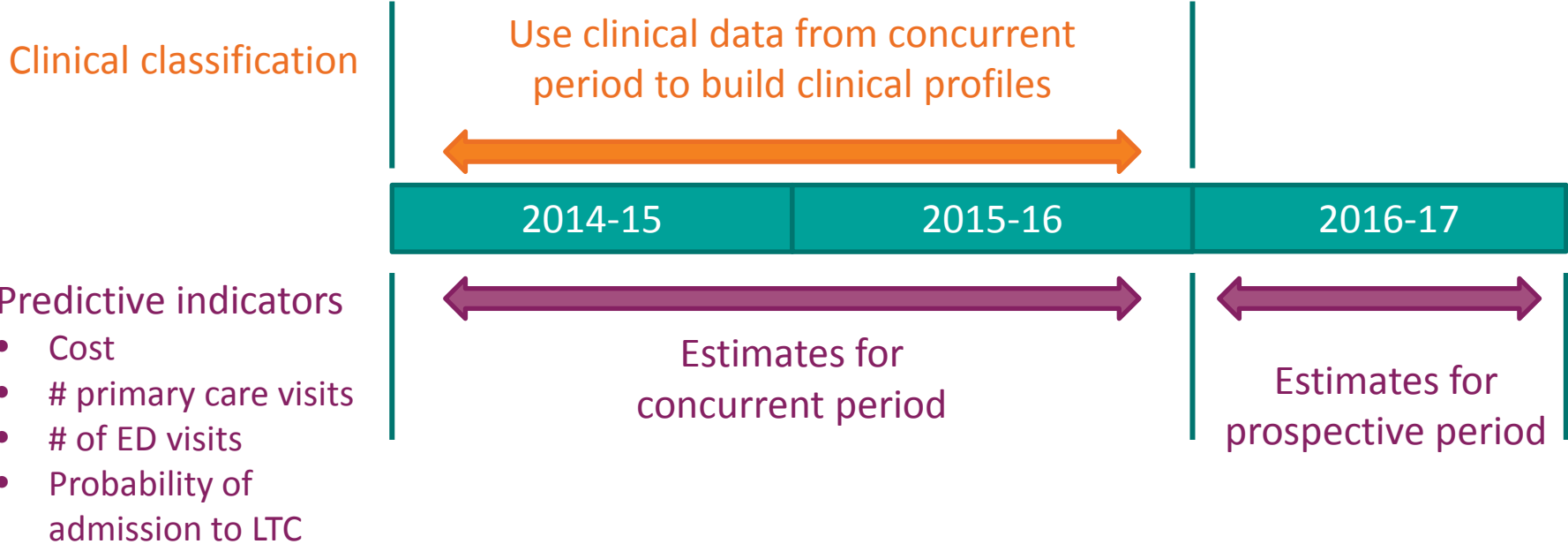
- Clinical classification
- Predictive indicators

Differences

- Multiple sectors
- Target population includes all persons registered for publicly-funded health care
- Looks at person over a 2-year time period



Concurrent and prospective periods



Creating clinical profiles

Data



Registry Data



Inpatient & Day Surgery
ED & Clinics
Inpatient MH
LTC & CCC



Physician billing claims



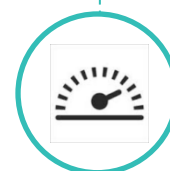
Outputs

Clinical Profile

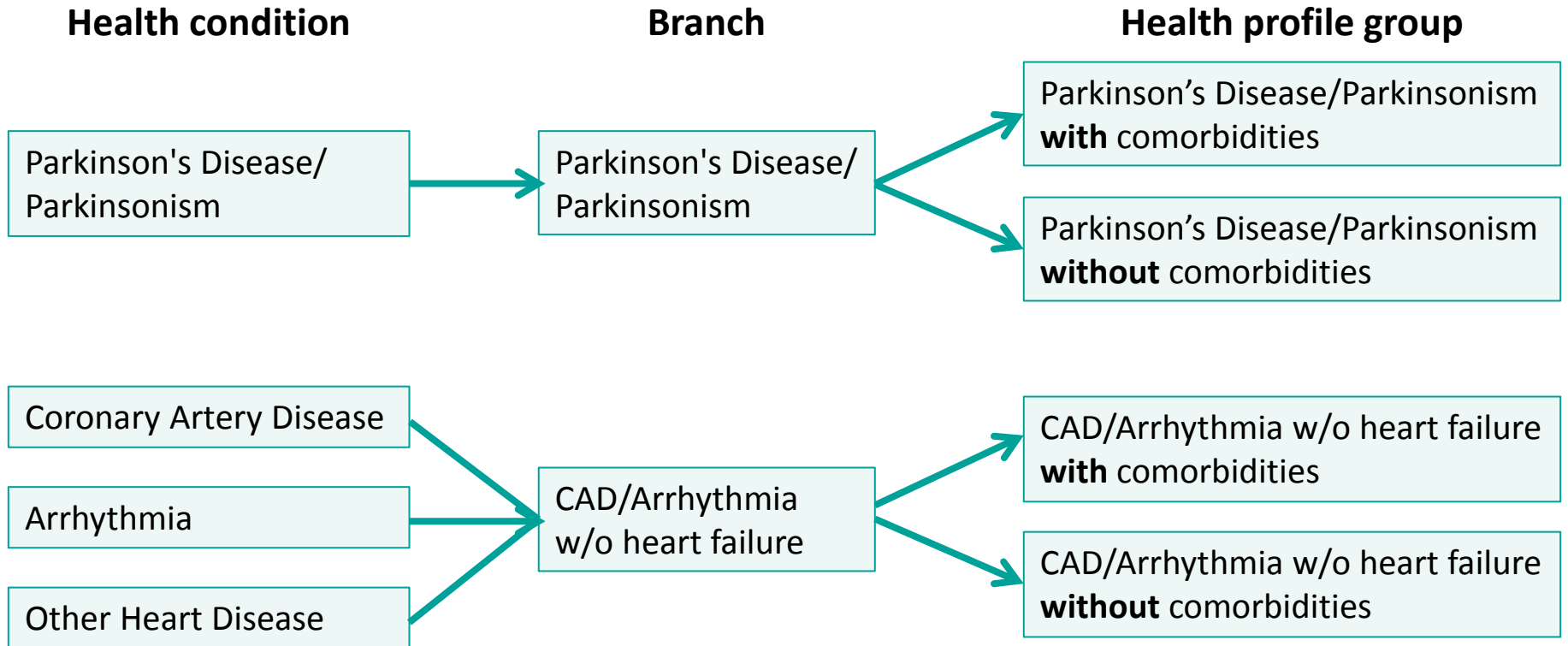
- 226 Health conditions
- Health Profile Group
- Functional status
- Health services accessed
- Demographics (age, sex, SES, geography)

Predictive Indicators

- Cost weights
- # primary care visits
- # of ED visits
- probability of admission to LTC



Creating health profile groups



Health profile groups

Can roll the data up or down

226 health conditions



239 health profile groups



164 branches



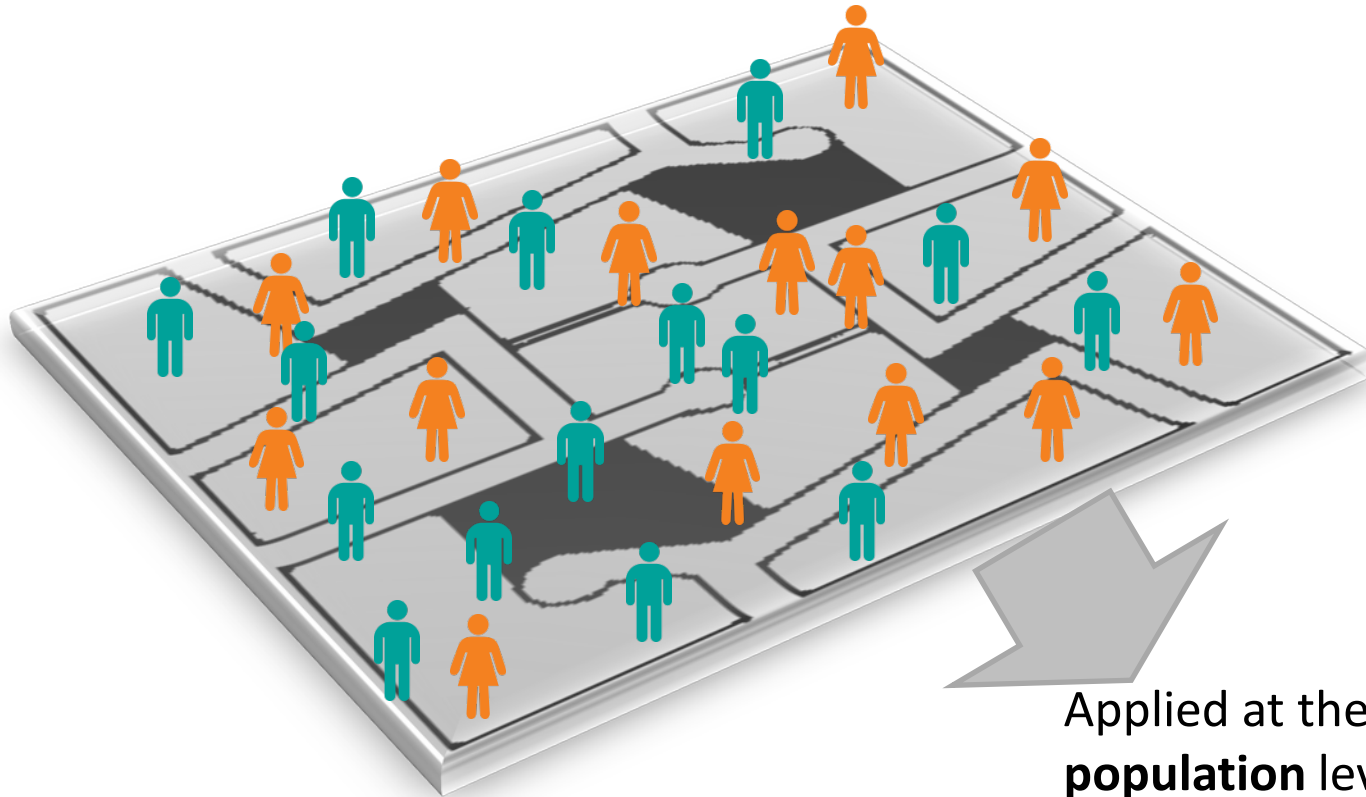
16 categories

- Major acute
- Major chronic
- Major cancer
- Major mental health
- Major newborn
- Moderate acute
- Moderate chronic
- Minor acute
- Minor chronic
- Other cancer
- Other mental health
- Obstetrics
- Healthy Newborn
- Palliative
- Users with no health conditions
- Non-users

Pop grouper outputs: person-specific profiles

Demographics	Settings encountered	Health conditions	Functional status	SES	Concurrent indicators	Prospective indicators
<ul style="list-style-type: none"> • Age: 69 • Gender: F • Toronto central 	<input checked="" type="checkbox"/> Inpatient <input type="checkbox"/> Day surgery <input type="checkbox"/> ED visit <input checked="" type="checkbox"/> PLPB <input checked="" type="checkbox"/> LTC	<ul style="list-style-type: none"> • Heart Failure (HPG assign) • Acute gastrointestinal hemorrhage • Osteoarthritis • Urinary tract infection/cystitis • Depression 	CHESS: 0 Pain: 1 ADL: 5 ABS: 5 PURS: 0 CPS: 0	<u>CANMARG</u> Dep: 4; Depriv: 4 Eth conc: 3; Res instb: 2 INSPQ : Mat: 3; Soc: 2 QAIPPE : 5	Cost: 1.14 ED visits: 1.1	Cost: 3.62 PC visits: 4.8 ED visit: 2.3 Pr (LTC): NA
<ul style="list-style-type: none"> • Age: 87 • Gender: M • Champlain 	<input checked="" type="checkbox"/> Inpatient <input type="checkbox"/> Day surgery <input checked="" type="checkbox"/> ED visit <input checked="" type="checkbox"/> PLPB <input type="checkbox"/> LTC	<ul style="list-style-type: none"> • Coronary artery disease • Disorder of electrolyte acid base balance • Chronic kidney disease/failure (HPG assign) • Anemia disorder 	N/A	<u>CANMARG</u> Dep: 4; Depriv: 4 Eth conc: 3; Res instb: 2 INSPQ : Mat: 3; Soc: 2 <u>QAIPPE</u> : 5	Cost: 4.08 ED visits: 3.2	Cost: 4.88 PC visit: 6.8 ED visit: 4.1 Pr (LTC): 0.41
<ul style="list-style-type: none"> • Age: 21 • Gender: M • North west 	<input type="checkbox"/> Inpatient <input type="checkbox"/> Day surgery <input type="checkbox"/> ED visit <input type="checkbox"/> PLPB <input type="checkbox"/> LTC	<ul style="list-style-type: none"> • Non-user (HPG assign) 	N/A	<u>CANMARG</u> Dep: 4; Depriv: 4 Eth conc: 3; Res instb: 2 INSPQ : Mat: 3; Soc: 2 <u>QAIPPE</u> : 5	Cost: 0 ED visits: 0	Cost: 0.10 PC visit: 0.10 ED visit: 0.50 Pr (LTC): NA

Clinical profile



Assigned at the **person** level

Applied at the **population** level



Applications of Pop Grouper

CIHI's population grouping methodology can...

Help CIHI and its clients monitor population health and diseases

Predict health care utilization patterns and explain variations in health care resource use

Assist in segmentation and profiling

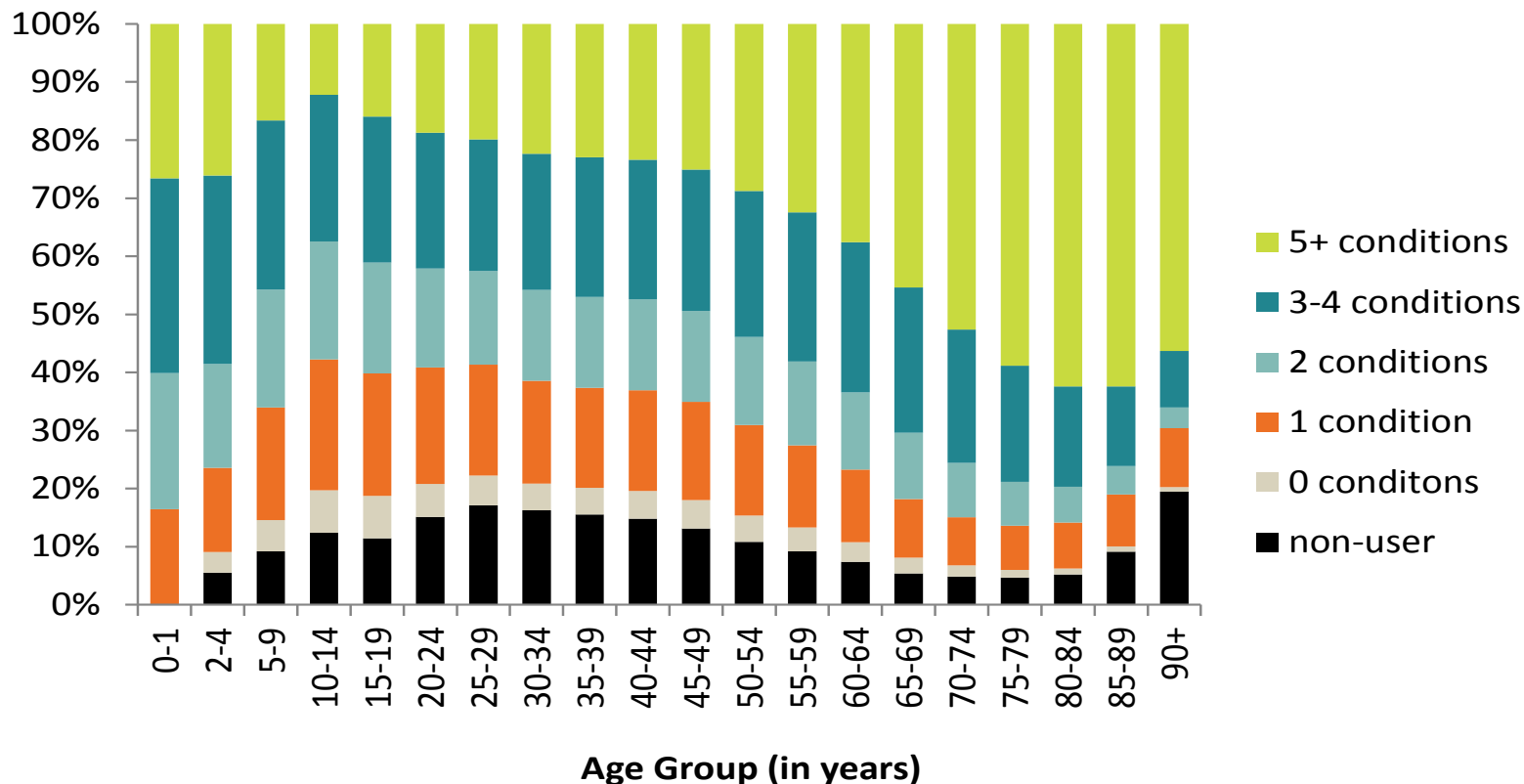
Assist health care providers in understanding their clients

Facilitate standardization (risk adjustment) of populations for inter-jurisdictional analysis

Provide a foundation for funding models

Distribution of health conditions, by age group

Distribution of health conditions, by age group

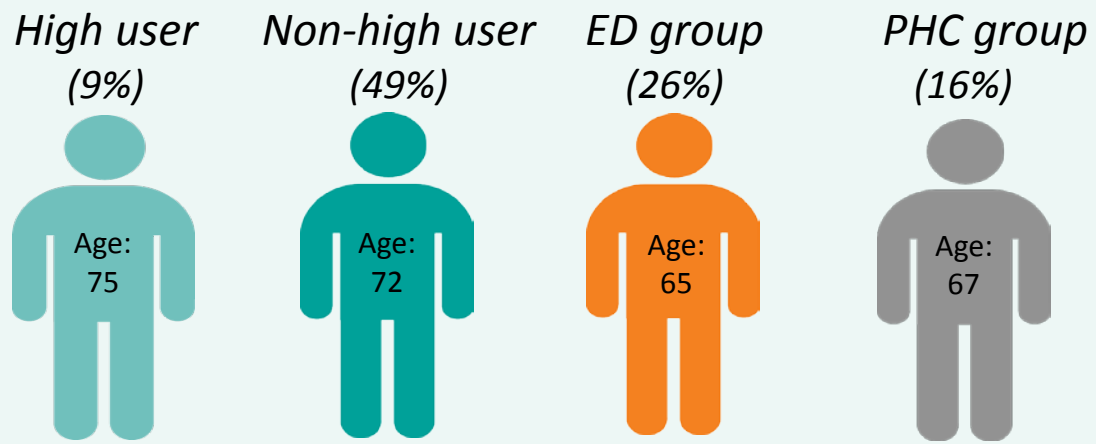


* 2010-2011 and 2011-2012 Ontario, Alberta, and B.C. data used in methodology development

Profiling the Population (Concurrent)

Decile	Volume	Average Cost	Average Predicted Cost	Proportion of Costs	Avg. # of Health Conditions	Average Age (in Years)	Min. Cost Weight	Max. Cost Weight
1	2,300,041	56	-7	0.2%	0.2	39.0	0.00	0.00
2	2,300,041	200	39	0.7%	0.8	27.1	0.00	0.03
3	2,300,041	317	145	1.1%	1.0	34.3	0.03	0.07
4	2,300,042	488	260	1.7%	1.8	33.6	0.07	0.12
5	2,300,041	725	474	2.5%	2.6	33.7	0.12	0.22
6	2,300,041	1,045	831	3.7%	3.2	36.9	0.22	0.37
7	2,300,042	1,507	1,361	5.3%	3.9	40.5	0.37	0.62
8	2,300,041	2,355	2,384	8.2%	4.7	46.9	0.62	1.11
9	2,300,041	4,252	4,615	14.9%	5.6	48.7	1.11	2.28
10	2,300,042	17,612	18,501	61.7%	8.0	56.4	2.28	173.46
All	23,000,413	2,856	2,860	100.0%	3.2	39.7	0.00	173.46

Multiple comorbidities is common among COPD patients in Alberta



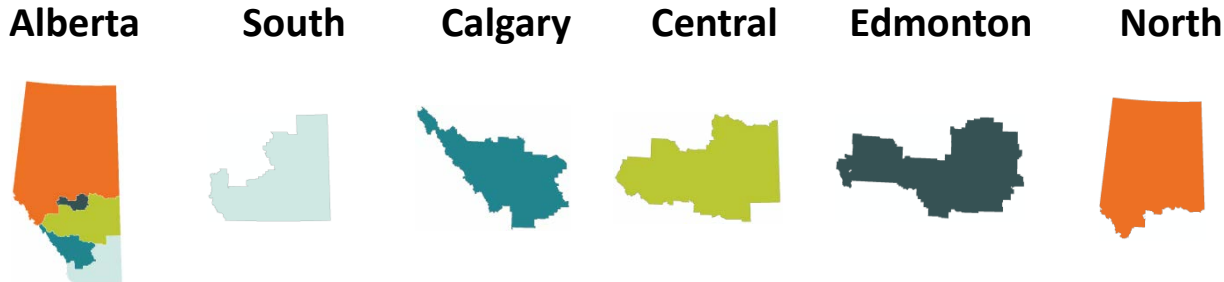
	High user (9%)	Non-high user (49%)	ED group (26%)	PHC group (16%)
Hypertension	77%	62%	27%	23%
Pneumonia	66%	41%	13%	4%
Heart failure	53%	26%	4%	2%
Arrhythmia	46%	28%	8%	5%
Diabetes	39%	28%	15%	9%
Coronary artery disease	39%	24%	6%	4%
Depression	31%	17%	8%	6%
Anxiety	20%	11%	8%	5%
Osteoporosis	17%	19%	1%	2%
Lung cancer	9%	7%	1%	1%

LTC admission indicator

Population Grouper Prediction					Actual	
Ventile	(2) # People	(3) Min. Prob. of Admission	(4) Max Prob. of Admission	(5) Average Predicted Number of Admissions	(6) Average Actual Number of Admissions	(7) Proportion of Admissions
1	153K	0.02%	0.06%	63	93	0.3%
2	153K	0.06%	0.11%	133	52	0.1%
3	153K	0.11%	0.12%	173	82	0.2%
4	153K	0.12%	0.14%	201	125	0.3%
5	153K	0.14%	0.16%	226	116	0.3%
17	153K	1.1%	1.4%	1,922	1,923	5.4%
18	153K	1.4%	2.1%	2,643	3,066	8.6%
19	153K	2.1%	4.0%	4,263	6,063	17.0%
20	153K	4.0%	91.1%	18,994	18,845	52.7%
All	3 M	0.0%	91.1%	36,078	35,756	--

53% of LTC admissions in the top 5%


Health zone profiling - AB



Health profile category

Health profile category	Alberta	South	Calgary	Central	Edmonton	North
Major chronic	2.6%	3.3%	2.4%	3.0%	2.6%	2.6%
Major acute	2.4%	2.4%	2.2%	2.8%	2.3%	2.6%
Major mental health	1.8% 7.5%	2.5% 9.2%	1.5% 6.9%	1.8% 8.5%	2.2% 7.7%	1.4% 7.2%
Major cancer	0.7%	1.0%	0.8%	0.9%	0.6%	0.6%
Moderate chronic	8.1%	9.1%	8.0%	8.3%	8.2%	7.5%
Moderate acute	5.6%	5.9%	5.3%	5.9%	5.8%	6.0%
Minor chronic	10.0%	10.2%	9.9%	10.5%	10.0%	10.0%
Minor acute	40.7%	37.6%	41.7%	40.7%	40.4%	40.5%
Other mental health	5.1%	5.3%	5.3%	4.5%	5.6%	4.0%
Other cancer	0.7%	0.8%	0.8%	0.6%	0.6%	0.5%

Case Mix Example: Alberta, FY2010/11 & 2011/12



	South	Calgary	Central	Edmonton	North
Number of Cases	302,545	1,483,222	463,656	1,239,421	476,915
Weighted Cases	329,470	1,414,737	506,682	1,228,352	486,963
Case Mix Index (CMI)	1.09	0.95	1.09	0.99	1.02

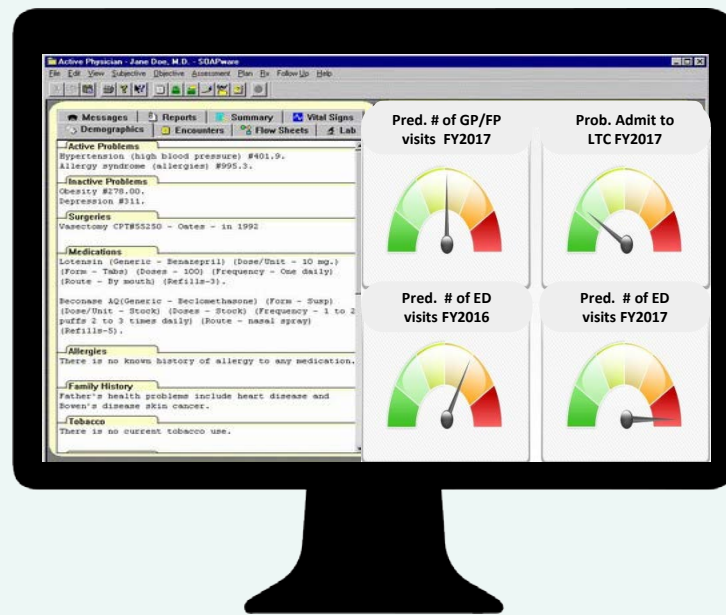
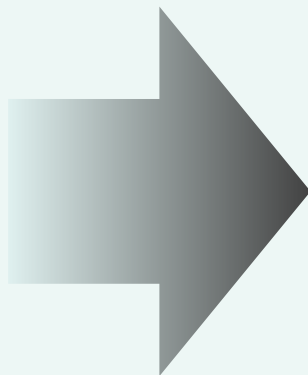
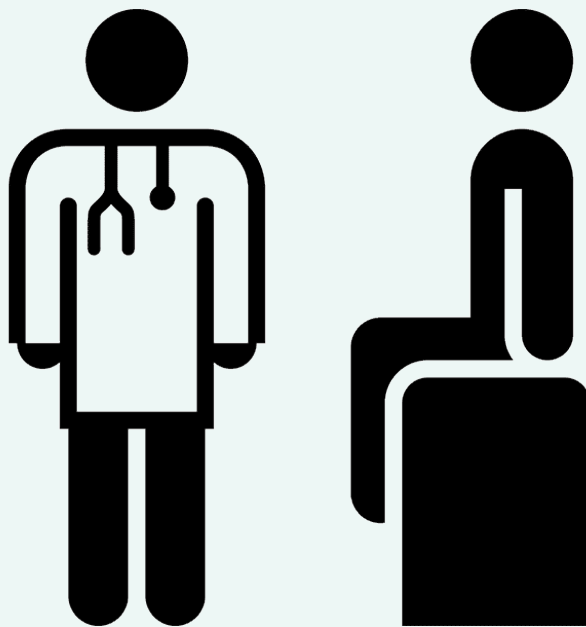
$$CMI = \frac{\text{weighted cases}}{\text{number of cases}} = \frac{\text{sum of cost weights}}{\text{number of people}}$$

Risk adjusted average cost (RAAC)

Region	# of cases (i.e. people)	Weighted cases	Case mix index (CMI)	Total cost	Average cost	RAAC
A	1.45M	1.3M	0.897	\$2,455M	\$1,693	\$1,888
B	0.3M	0.344M	1.147	\$556M	\$1,853	\$1,616
C	0.45M	0.556M	1.236	\$889M	\$1,976	\$1,599
Total	2.2M	2.2M	1.000	\$3.9B	\$1,773	\$1,773

$$\text{RAAC} = \frac{\text{average cost}}{\text{CMI}}$$

Use of population grouper at points of care





Population grouping methodology

Future versions

Version 2.0 and beyond

- **Home care assessment information**
 - Functional status
- **Prescription drug information**
 - Indication of health conditions
- **Additional costs**
 - Long term care, home care, mental health, prescription drugs
- **Registry data and physician FFS data from more province/territories**
- **Electronic medical record (EMR) and electronic health record (EHR) data**





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