Population Grouper:
Decision support for health care and policy decisions

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Canadian Institute for Health Information

What is POP?
And how does it work?

What is Case Mix?

The mix of patients treated in a hospital or other health care setting

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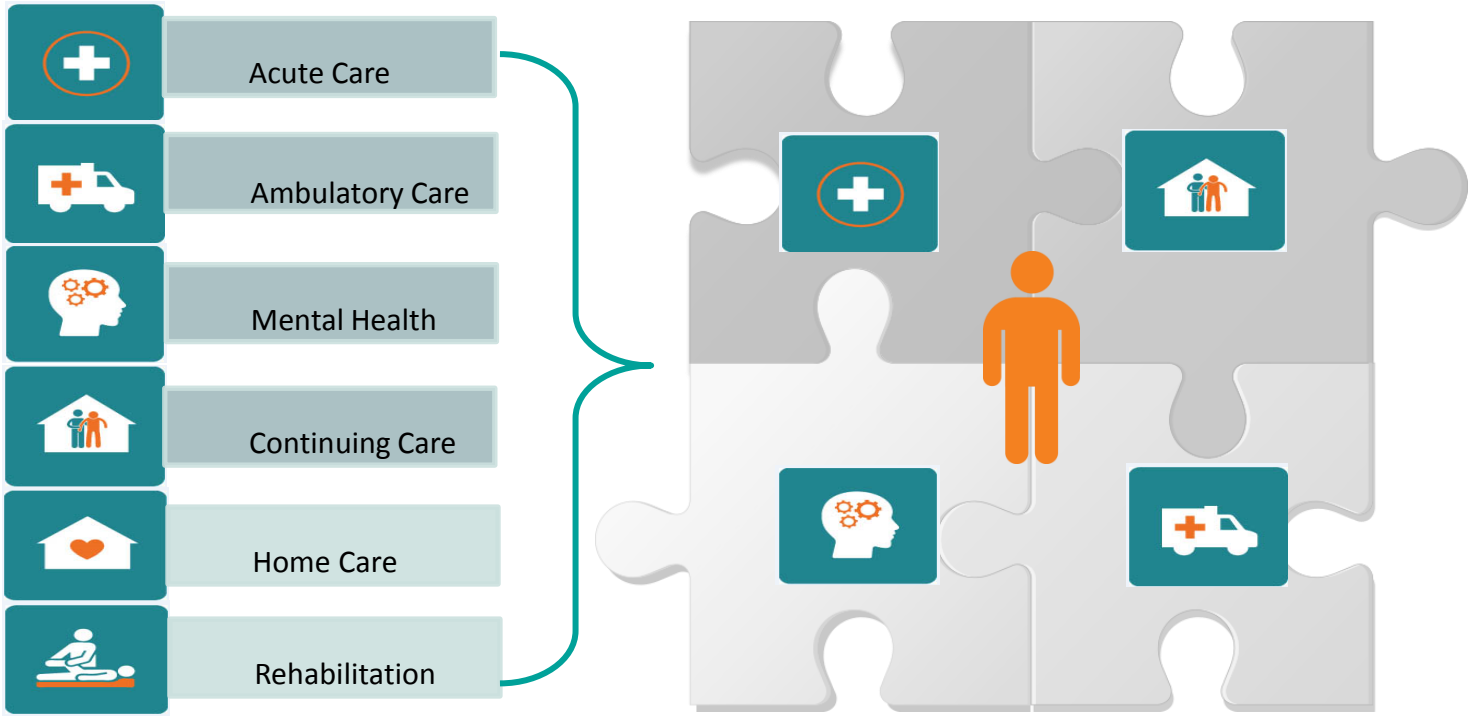
Case Mix and the Population Grouping Methodology (POP) at CIHI



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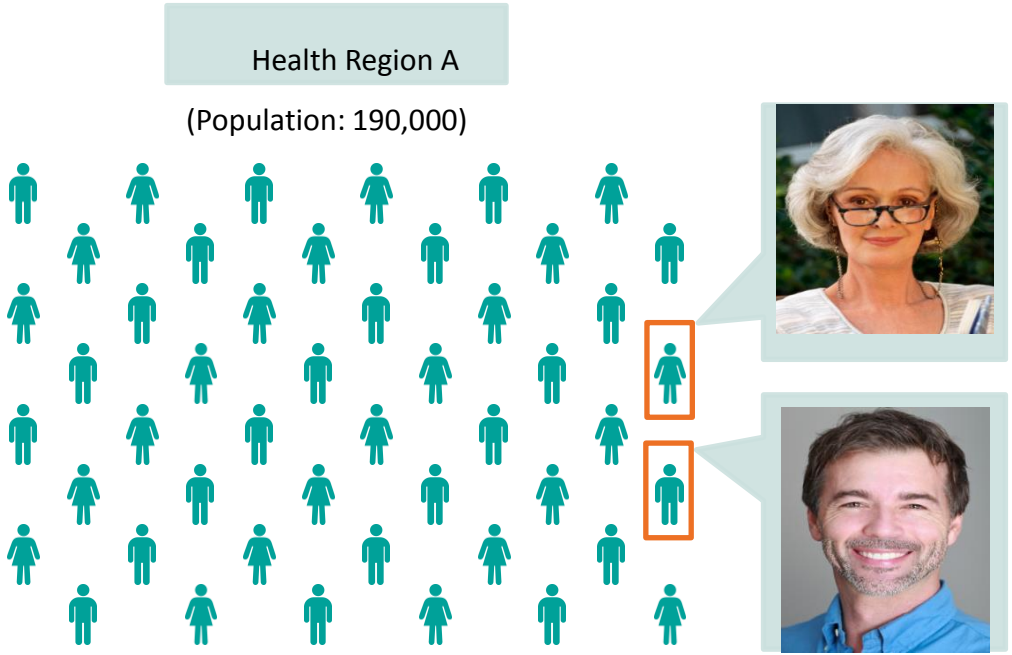
Population Grouping Methodology - an illustration



How much will **someone** with this profile cost the health system next year?

Clinical data
- Hospital
- Long-term care
- Physician billing

Demographic data
- Date of Birth
- Gender
- Postal Code

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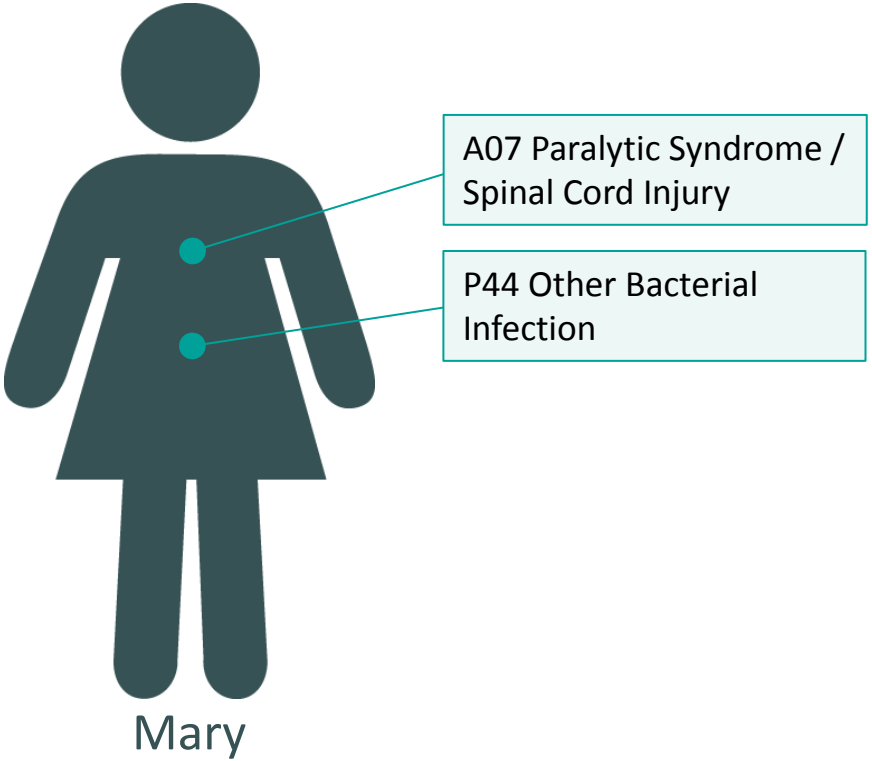
Assigning cost weights



Cost Weights			
		Cost Indicator Effect	
		Concurrent	Prospective
Mary	A07	4.95	1.07
	P44	0.27	0.29
	Total	**5.22**	**1.36**
Joe	Age/Sex	0.05	0.24
	Total	**0.05**	**0.24**

Estimated **prospective** cost for a person (illustration)

prospective cost weight is 1.36

Population average prospective cost is $1,483

expected **prospective** cost:

$2,017 = $1,483 x 1.36

prospective cost weight is 0.24

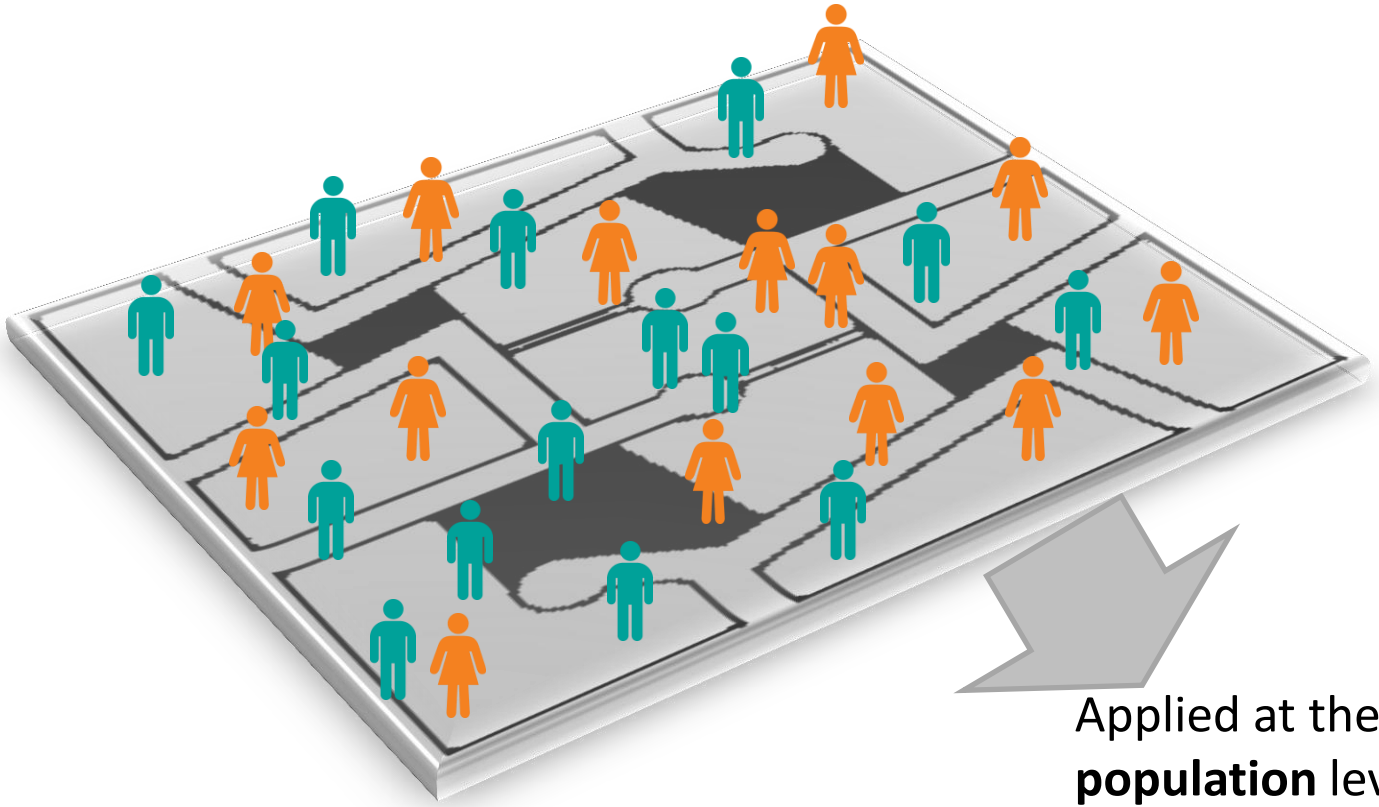
Population average prospective cost is $1,483

expected **prospective** cost:

$356 = $1,483 x 0.24

Mock data

Predictive indicators

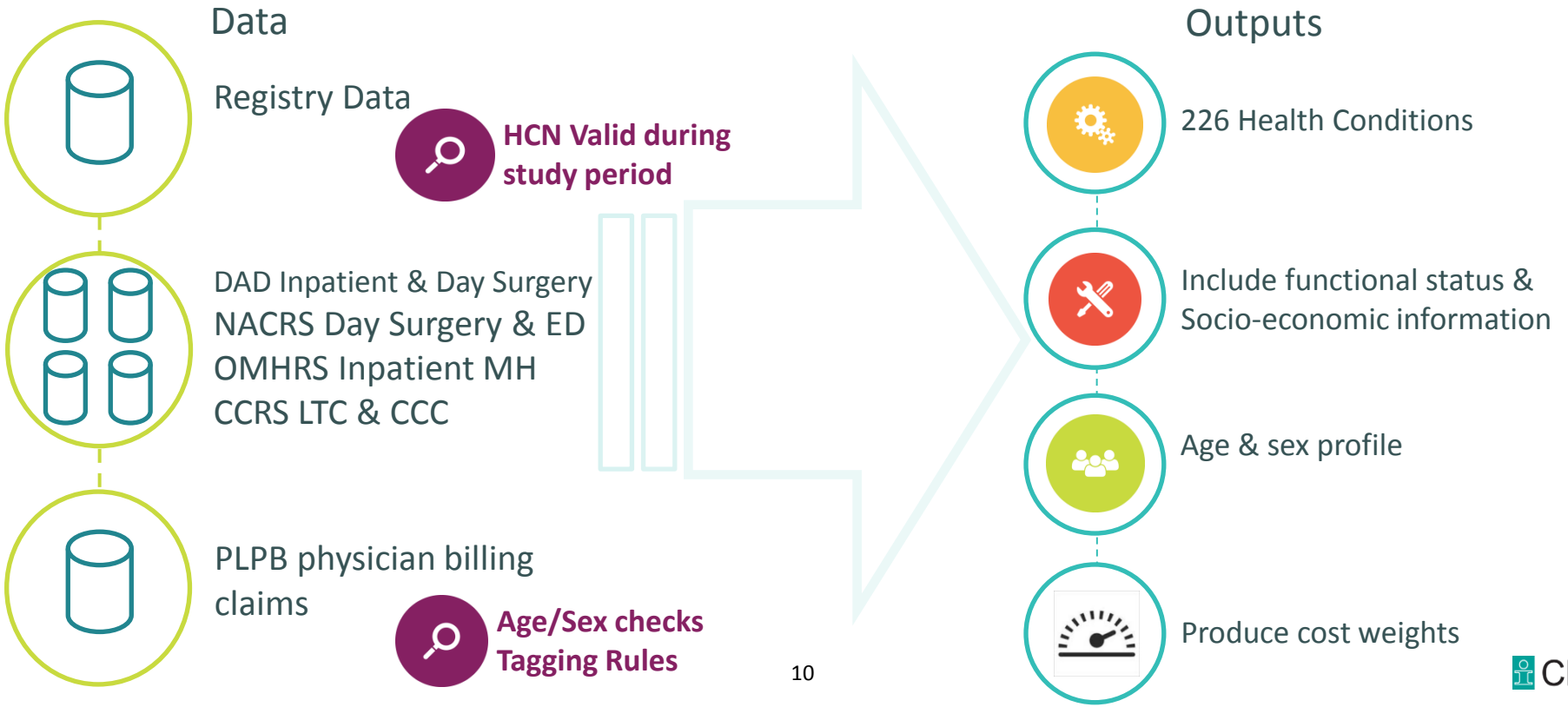


Predicts at the **person** level

Applied at the **population** level

Looking under the hood: the mechanics of POP

Creating clinical profiles in POP



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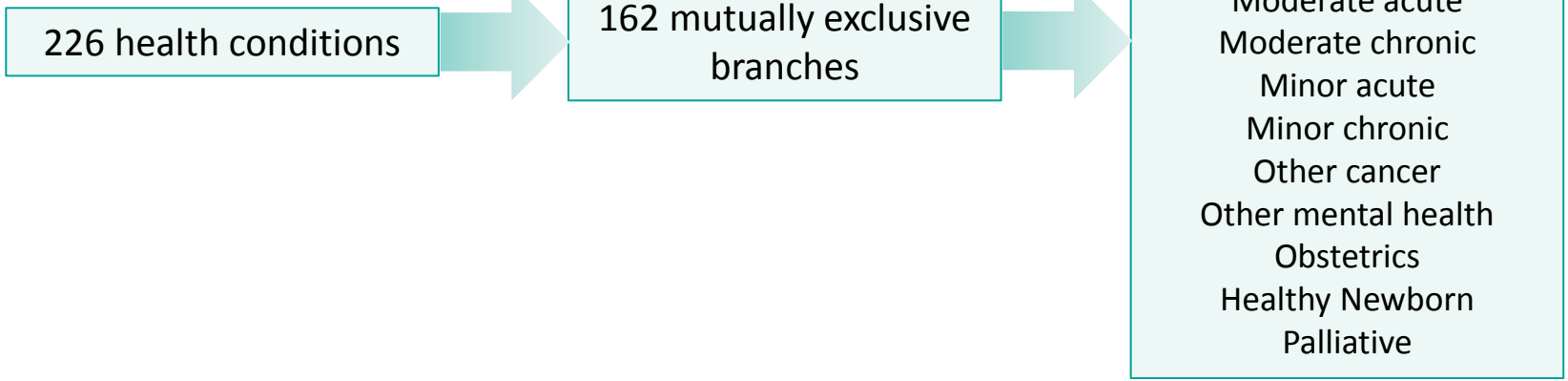
POP output: person-specific profiles

Demographics	Facility type visited	Health conditions	Functional status	Socioeconomic Status	Concurrent cost weight	Prospective cost weight
• Age: 69 • Gender: F	☑ Inpatient ☐ day surgery ☑ LTC ☐ PLPB ☐ ED	• Heart Failure • Acute gastrointestinal hemorrhage • Osteoarthritis • Urinary tract infection/cystitis • Depression	CHESS: 0 Pain: 1 ADL: 5 ABS: 5 PURS: 0 CPS: 0	**CANMARG** Dep: 4; Depriv: 4; Eth conc: 3; Res instb: 2 **INSPQ:** Mat: 3; Soc: 2 **QAIPPE:** 5	1.1350	3.6234
• Age: 87 • Gender: M	☑ Inpatient ☐ day surgery ☐ LTC ☑ PLPB ☐ ED	• Coronary artery disease • Disorder of electrolyte acid base balance • Chronic kidney disease/failure • Anemia disorder	N/A	**CANMARG** Dep: 4; Depriv: 4; Eth conc: 3; Res instb: 2 **INSPQ:** Mat: 3; Soc: 2 **QAIPPE**: 5	4.0825	4.8755
• Age: 21 • Gender: M	☐ Inpatient ☐ day surgery ☐ LTC ☐ PLPB ☐ ED	N/A	N/A	**CANMARG** Dep: 4; Depriv: 4 Eth conc: 3; Res instb: 2 **INSPQ:** Mat: 3; Soc: 2 **QAIPPE:** 5	0.0556	0.5819

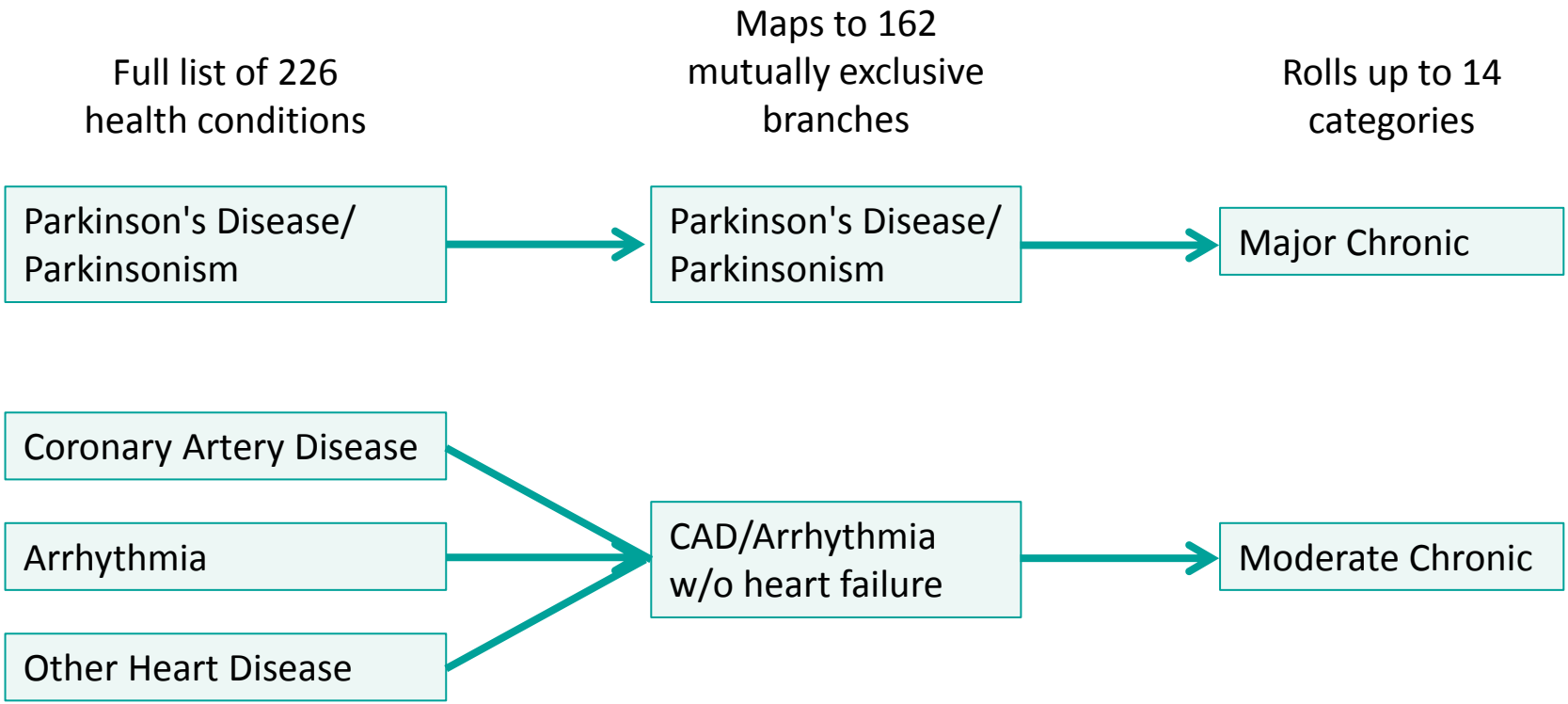
Additional features in 2016 release

Mutually Exclusive Grouper

Identifies the health condition driving an individual's clinical profile



Mutually Exclusive Grouper – an example



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Beyond predicting cost…

POP uses an individuals' health conditions, age and sex to predict:

Number of visits to a family physician

Admission into long-term care

Visits to an emergency department

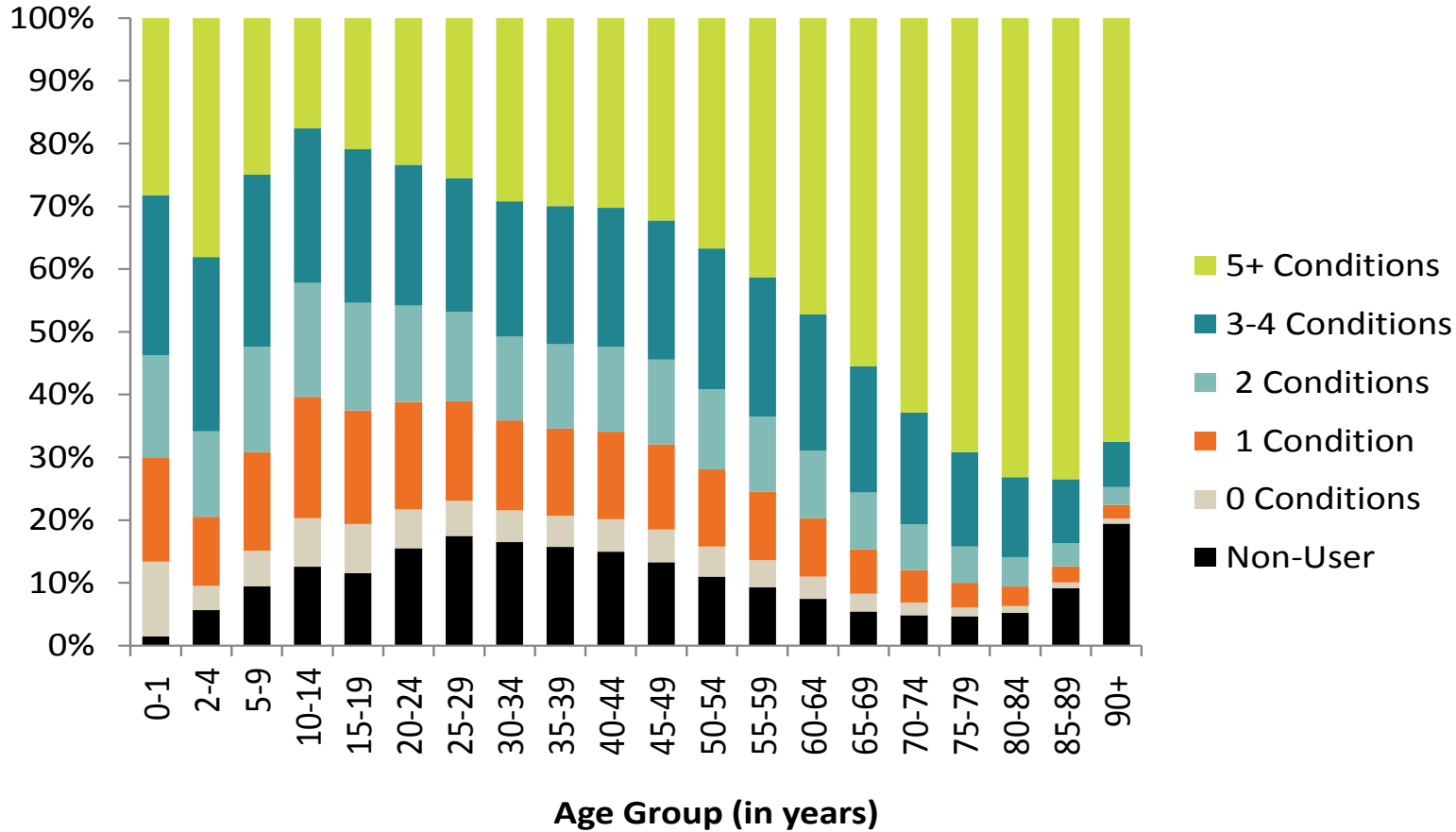
Applications of POP

Relevance for health care in Canada

CIHI's population grouping methodology will

- Help CIHI and its clients monitor population health and diseases
- Allow comparisons of inputs across jurisdictions
- Predict health care utilization patterns and explain variations in health care resource use
- Facilitate standardization of populations for inter-jurisdictional analysis
- Identify high cost users
- Provide a foundation for funding models

Distribution of health conditions, by age group



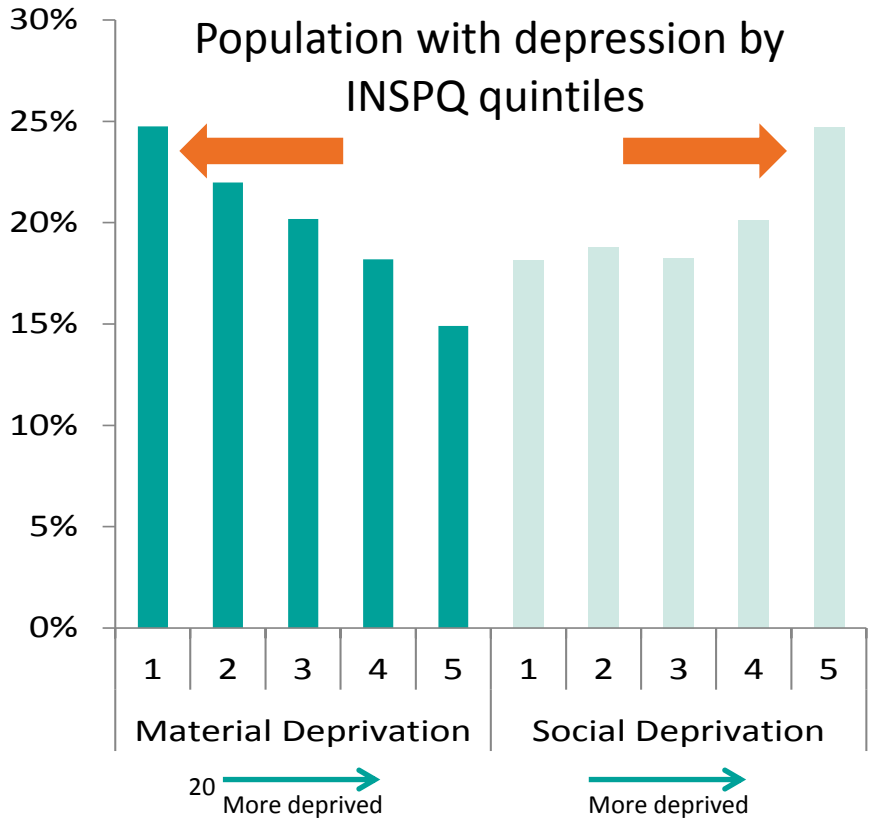
* 2010-2011 and 2011-2012 Ontario, Alberta, and B.C. data used in methodology development

Profiling of BC, AB and ON population (concurrent)

Decile	Volume	Average Cost	Average Predicted Cost	Proportion of Costs	Proportion of Predicted Costs	Avg. # of Health Conditions	Average Age (in Years)	Min. Cost Weight	Max. Cost Weight
1	2.3M	$56	$0	0.2%	0.0%	0.2	39.0	0.00	0.00
2	2.3M	$200	$39	0.7%	0.1%	0.8	27.1	0.00	0.03
3	2.3M	$317	$145	1.1%	0.5%	1.0	34.3	0.03	0.07
4	2.3M	$488	$260	1.7%	0.9%	1.8	33.5	0.07	0.12
5	2.3M	$725	$474	2.5%	1.7%	2.6	33.7	0.12	0.22
6	2.3M	$1,046	$830	3.7%	2.9%	3.2	36.9	0.22	0.37
7	2.3M	$1,507	$1,359	5.3%	4.8%	3.9	40.5	0.37	0.62
8	2.3M	$2,356	$2,380	8.3%	8.3%	4.7	46.9	0.62	1.11
9	2.3M	$4,252	$4,608	14.9%	16.1%	5.6	48.7	1.11	2.28
10	2.3M	$17,612	$18,470	61.7%	64.6%	8.0	56.4	2.28	173
All	23M	$2,856	$2,860	100%	100%	3.2	39.7	0.00	173

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

Socioeconomic Status (SES), for People with Depression



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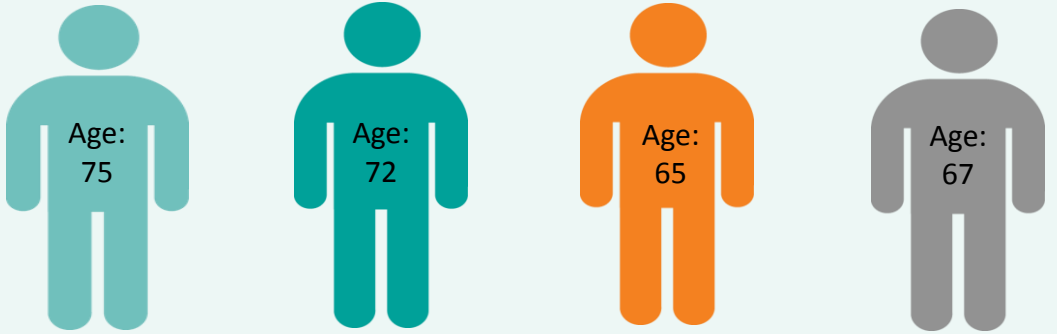
Multiple comorbidities is common among COPD Patients in Alberta



	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%

Based on FY 2012-13 for all groups except PHC group. PHC group based on FY 2011-12

Case Mix example

Region	# of Cases (i.e. people)	Weighted Cases	Case Mix Index (CMI)
A	1.45M	1.3M	0.897
B	0.3M	0.344M	1.147
C	0.45M	0.556M	1.236
Total	2.2M	2.2M	1.000

- Weighted cases = sum of cost weights for a sub-population or group of people
- In population grouping, the person is the case

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

Mock data

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

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

Mock data

Population based funding

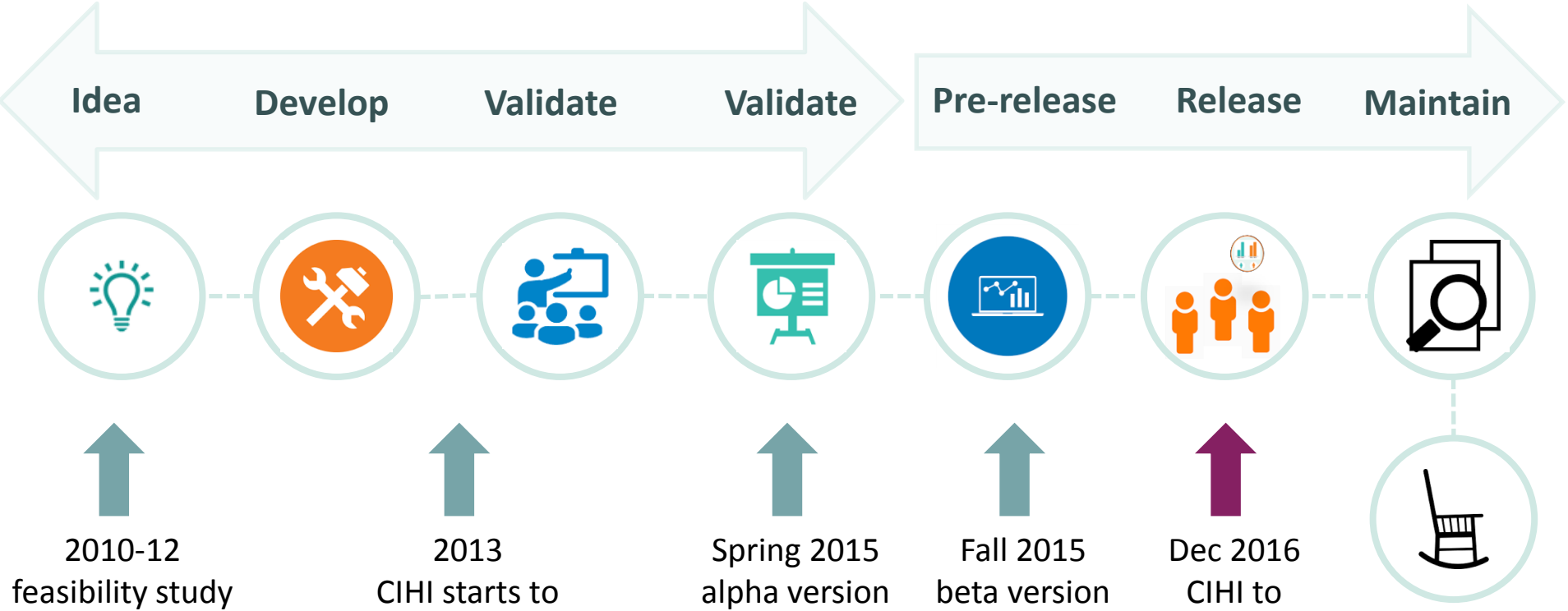
Region	Total Cost – Historical funding	Weighted Cases	Proportion of Weighted Cases	Population Based Funding
A	$2,455M	1.3M	59.1% = $\frac{1.3M}{2.2M}$	**$2,304M** = .591 x $3.9B
B	$556M	0.344M	15.6% = $\frac{.344M}{2.2M}$	**$610M** = .156 x $3.9B
C	$889M	0.556M	25.3% = $\frac{.556M}{2.2M}$	**$986M** = .253 x $3.9B
Total	$3.9B	2.2M	100%	$3.9B

Funding for upcoming period

- Proportion of weighted cases is used to divide overall budget

Final thoughts

Indicator Life Cycle – POP



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Version 2.0 and Beyond

Home care assessment information
- Functional status

Drug information
- Indication of health conditions

Additional costs
- Long term care; Home care; Drugs

Registry data and physician FFS data from more jurisdictions

Final thoughts - CIHI population grouping methodology

Population grouping methodologies provide strategic information for policy level decision making at the regional and provincial levels.

Pop groupers help make sense of linked health data for use in provincial/regional health planning, funding and risk adjustment.

Understanding how to make effective use of this information requires a nationally standardized vocabulary. CIHI's Pop grouper provides this.

Canadian Institute for Health Information

Better data. Better decisions. Healthier Canadians.

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