

A cause for discomfort

– cost and use of healthcare by Ontarians with chronic pain

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Background

- 19% Canadian adults have chronic pain
 - 50% present for at least 10 years
- Prevalence will increase
 - Aging, obesity, diabetes
- People with chronic pain have more physician visits, more hospitalization



Canadian cost estimates for pain

Study	Pain	Location	n (pain cohort)	n (control)	Mean Direct medical (annual, 2013)
Guerriere 2010	Chronic pain	7 provinces	370	-	\$2,000*
Phillips 2008	Chronic pain	Alberta	~670	~5,300	\$4,400 (Inc)
Lachaine 2010	Fibromyalgia	Quebec	16,010	16,010	\$1,400 (Inc)
Penrod 2004	Fibromyalgia	Quebec	180	-	\$2,800 [§]
White 1999	Fibromyalgia	Ontario	95	380	\$ 600 [†] (Inc)
McGillion 2008	Angina	Ontario	130	-	\$3,500 [‡]
Lachaine 2007	Neuropathic pain	Quebec	4,912	4,912	\$2,800 (Inc)
Piwko 2007	Multiple Sclerosis	Canada	211	-	\$5,900

Inc = incremental cost.

* Total direct and indirect \$19,100.

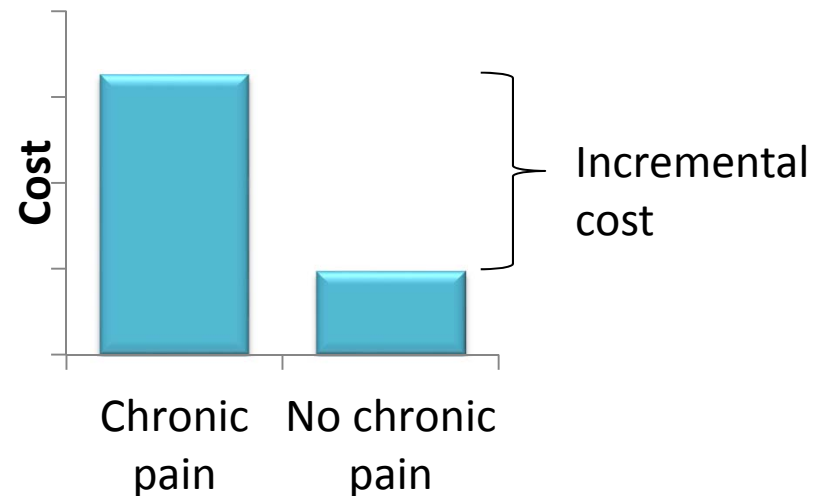
† OHIP costs only.

‡ Total direct and indirect \$22,300.



Objective

- To estimate the per-person incremental cost of managing chronic pain in Ontario
 - Perspective: Ontario Ministry of Health and Long-term care
 - One year



Study design

- Population-based observational matched cohort
12 years to 100+ years

Canadian Community Health Survey



Statistics
Canada

2000-01

2007-08

2009-10



Ontario

Ministry of
HEALTH AND
LONG-TERM CARE



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Case identification

Canadian Community Health Survey

“The next set of questions asks about your day-to-day health. The questions are not about illnesses like colds that affect people for short periods of time. They are concerned with a person’s usual abilities.”

1. “Are you usually free of pain or discomfort?” (Y/N)
2. “How would you describe the usual intensity of your pain or discomfort?” (mild, moderate, severe)
3. “How many activities does your pain or discomfort prevent?” (none, a few, some, most)



Administrative data

Included

- Physician visits
- Hospital stays
- Outpatient hospital-based treatment (e.g. day surgeries, dialysis, oncology)
- Lab tests
- Drug costs ≥ 65 , social assistance
- Medical equipment (e.g. wheel chair)
- Long-term care, rehab, complex continuing care, homecare

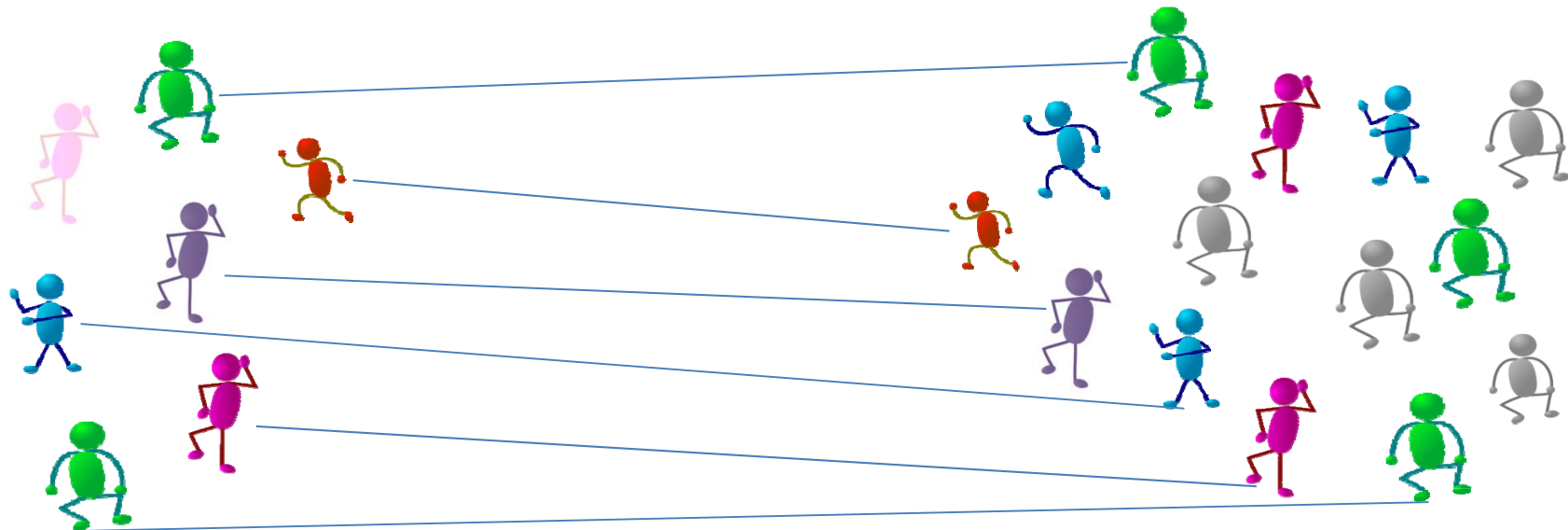
Not included

- Drug costs < 65 years (except social assistance)
- Physiotherapy
- Psychological services
- Dental
- Out-of-pocket



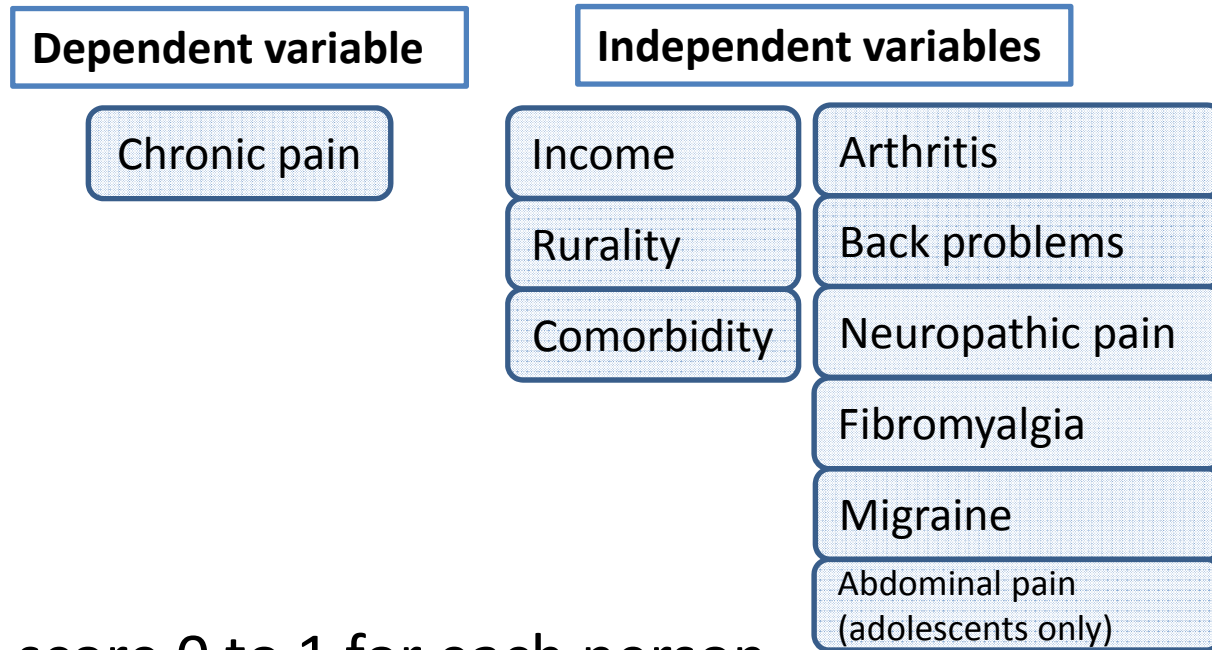
Propensity matching

- Two steps:
 - Calculate propensity score
 - Match 1:1 using score and other variables



Propensity score

- Logistic regression



- Predicts score 0 to 1 for each person
 - Probability of having chronic pain



Matching algorithm

- Matching algorithm:
 - Age (± 1 year)
 - Sex
 - Year of interview (± 1 year)
 - Propensity score (± 0.2 SD)
- Greedy



Results



Canadian Community Health Survey

	2000-01 n=32,474	2007-08 n=34,030	2009-10 n=32,999	Overall n= 99,503
Contribution to cohorts (%)	33	34	33	100
Female (%)	54	54	55	54
Age (mean years)	45	48	48	47
12 – 17 years (%)	10	9	10	9
18 – 64 years (%)	71	68	65	68
≥ 65 years (%)	19	23	25	23
Chronic pain (%)	19	21	20	20



Patient characteristics

	Pain n=19,879	No pain n=79,624	d*
Age (years)	55	45	0.53
Female (%)	61	53	0.17
Rurality Index of Ontario (0-100)	19	17	0.06
Income quintile			
1 (low)	24	19	0.12
2	21	20	0.04
3	19	20	0.02
4	19	20	0.05
5 (high)	17	20	0.10
ADGs (0-32)	4.8	3.1	0.58
Depression (%)	4	2	0.15
Anxiety (%)	19	11	0.24
Sleep problem (%)	3	2	0.11
Arthritis (%)	22	6	0.47
Back or neck pain (%)	18	7	0.35
Neuropathic pain (%)	13	4	0.33
Migraine (%)	3	1	0.10
Fibromyalgia (%)	0.1	0.0	0.04
Adolescent abdominal pain (%)	0.3	0.6	0.05

* d = standardized difference

Standardized difference

Continuous variable:
$$\frac{\text{mean in cases} - \text{mean in controls}}{\sqrt{\frac{\text{variance in cases} + \text{variance in controls}}{2}}}$$

Binary variable:

$$\frac{\text{prevalence in cases} - \text{prevalence in controls}}{\sqrt{\frac{\text{prevalence in cases} * (1 - \text{prevalence in cases}) + \text{prevalence in controls} * (1 - \text{prevalence in controls})}{2}}}$$



Patient characteristics

		Pain n=19,879	No pain n=79,624	d*	Pain n=18,492	Controls n=18,492	d*
Age (years)		55	45	0.53	55	55	<0.01
Female (%)		61	53	0.17	60	60	0
Rurality Index of Ontario (0-100)		19	17	0.06	19	18	0.03
Income quintile	1 (low)	24	19	0.12	23	23	0.01
	2	21	20	0.04	21	22	0.02
	3	19	20	0.02	19.5	20	0.01
	4	19	20	0.05	19	18	0.02
	5 (high)	17	20	0.10	17	17	<0.01
ADGs (0-32)		4.8	3.1	0.58	4.5	4.6	<0.01
Depression (%)		4	2	0.15	4	3	0.08
Anxiety (%)		19	11	0.24	19	15	0.08
Sleep problem (%)		3	2	0.11	3	3	0.03
Arthritis (%)		22	6	0.47	19	18	0.02
Back or neck pain (%)		18	7	0.35	16	15	0.01
Neuropathic pain (%)		13	4	0.33	11	11	<0.01
Migraine (%)		3	1	0.10	2	2	<0.01
Fibromyalgia (%)		0.1	0.0	0.04	0.1	0.1	<0.01
Adolescent abdominal pain (%)		0.3	0.6	0.05	0.3	0.3	<0.01

* d = standardized difference

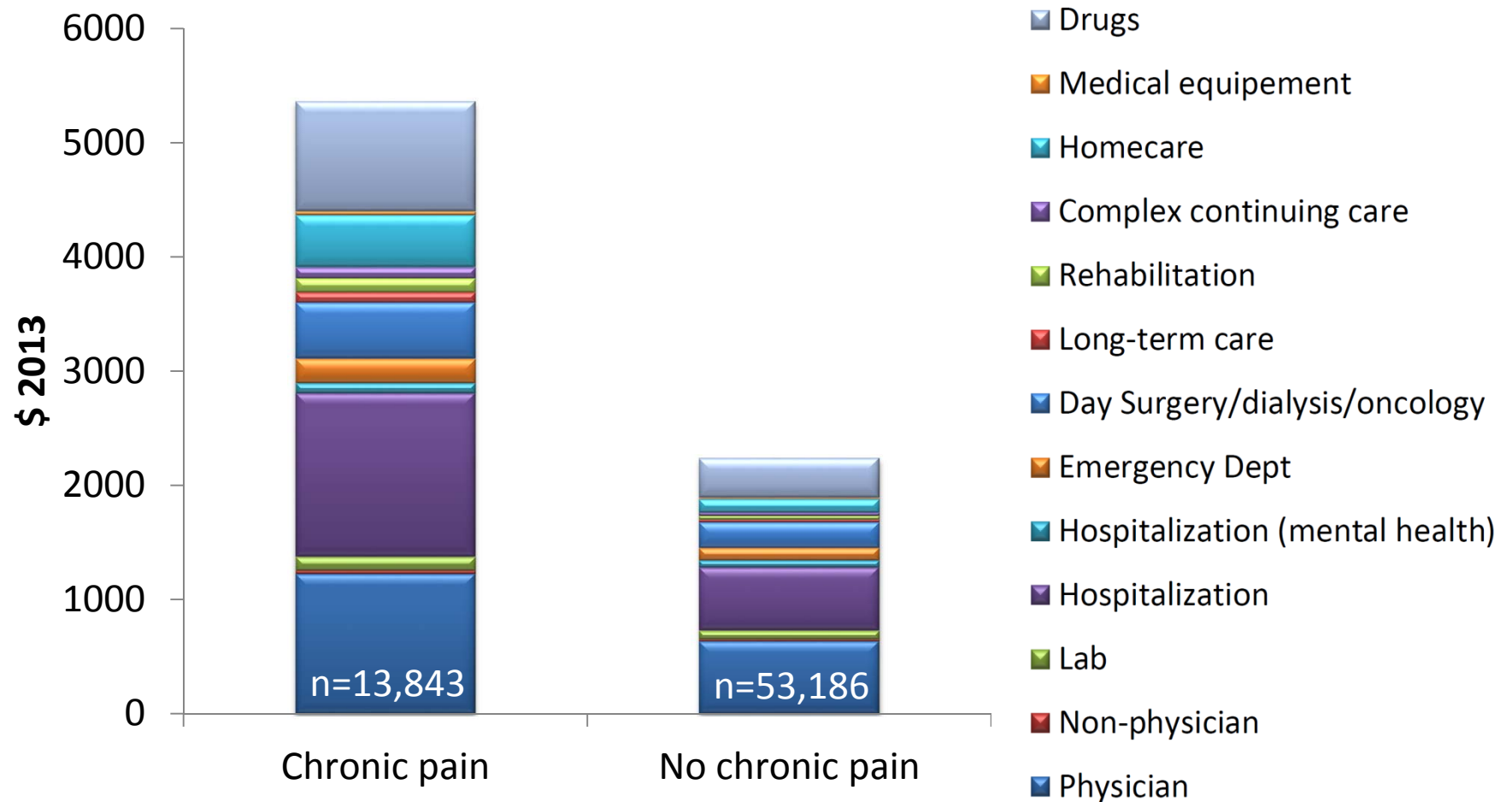
Health services use

For 1 year following the interview date.

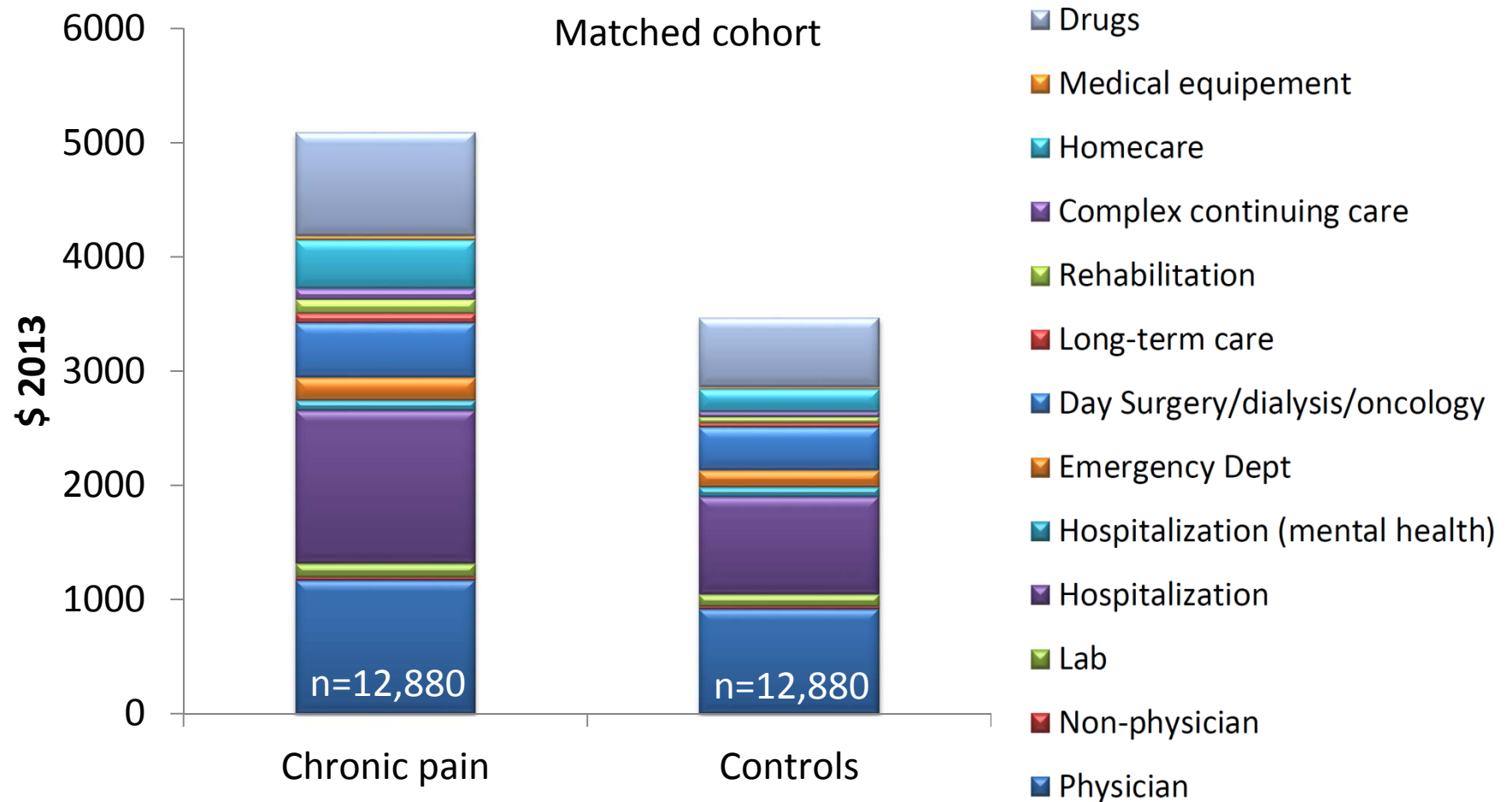
	Chronic pain n=18,492	Controls n=18,492	p
Physician visits per person	20	16	<0.001
At least 10 physician visits (%)	64	55	<0.001
At least 1 ED visit (%)	33	27	<0.001
At least 1 hospital stay (%)	24	20	<0.001
At least 1 CT (%)	13	9	<0.001
At least 1 MRI (%)	7	4	<0.001



Total one year per-person cost



Total one year per-person cost



One year incremental cost (\$2013)

For 1 year following the interview date.

Per person	Cost (\$2013) n=12,880	95% CI (\$2013)
Incremental cost	1,629	1,347 – 1,903
Physician visits	252	213 – 294
Non-physician visits	7	4 – 9
Lab	12	7 – 16
Hospitalization	487	331 - 636
Hospitalization (mental health)	6	-74 – 54
Emergency department	52	41 – 63
Outpatient surgery/dialysis/oncology	101	2 - 195
Assistive devices program	18	9 - 26
Long term care	48	20 - 78
Rehabilitation	69	27 - 108
Complex continuing care	43	-6 - 90
Homecare	232	181 - 287
Drugs	301	233 - 357

Cost subgroups (\$2013)

For 1 year following the interview date.

Per person	Incremental cost (\$2013)	95% CI (\$2013)	n pairs
Incremental cost	1,629	1,347 – 1,903	12,880
Female	1,621	1,291 – 1,950	7,815
Male	1,642	1,144 – 2,119	5,065
Adolescents 12 - 17	1,066	345 – 1,966	270
Adults 18 - 64	1,144	875 -1,429	8,298
Seniors 65 +	2,598	1,935-3,263	4,312



Cost by pain category (\$2013)

For 1 year following the interview date.

Per person	Incremental cost (\$2013)	95% CI (\$2013)	n pairs
Incremental cost	1,629	1,347 – 1,903	12,880
Mild pain	381	-40 – 751	3,859
Moderate	1,513	1,102 – 1938	6,839
Severe pain	4,201	3,433 – 4,959	2,182
No activities prevented	289	-190 – 590	3,153
A few activities prevented	863	312 – 1475	3,790
Some activates prevented	1,304	718 – 1,852	3,344
Most activity prevented	4,798	4,054 – 5,606	2,592



Is this a lot?

- 1 year \$1,629
- Canada per capita \$3,800 annual
- Prevalence 19%



Extrapolation to population (\$2013)

	Ontario	Canada
Number of adolescents with chronic pain (5%)	45,198	112,992
Total adolescent cost (\$1,066 pp)	\$ 48,181,531	\$ 120,449,922
Number of adults with chronic pain (19%)	1,720,809	4,471,399
Total adult cost (\$1,144 pp)	\$ 1,968,605,535	\$ 5,115,280,340
Number of seniors with chronic pain (28%)	599,370	1,566,460
Total senior cost (\$2,598 pp)	\$ 1,557,162,068	\$ 4,069,662,862
Total, 1 year	\$ 3.6 billion	\$ 9.3 billion
Forecast public health spending (2014)	\$ 55 billion	\$ 151 billion
Percent of health budget	6.5 %	6.2 %



Limitations

- Self-reported chronic pain
- Matching cannot consider unmeasured confounders
 - e.g. some patients might get more diagnostic tests and referrals because of their demands, not illness
- Data was collected for other purposes
 - Pain duration and onset unavailable
- Publicly funded costs only
 - Physiotherapy, psychological services, drugs, dental not publicly funded



Implications

- First study of the cost of chronic pain using Ontario administrative data
- Up to date, comprehensive estimate
 - Inform decision makers
 - Data for cost-effectiveness studies
 - Benchmark



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SickKids[®]



Thank you

