

## Cost-utility analysis of a Community Paramedicine Program for low-income seniors: **the Community Paramedicine at Clinic Program (CP@clinic)**

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# Conflict Declaration

Professor at McMaster University

Projects funded by CIHR

No personal or professional conflict to declare



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# Context:



Comm  
and inc

e-based

RESEARCH ■ VULNERABLE POPULATIONS

## Evaluation of a community paramedicine health promotion and lifestyle risk assessment program for older adults who live in social housing: a cluster randomized trial

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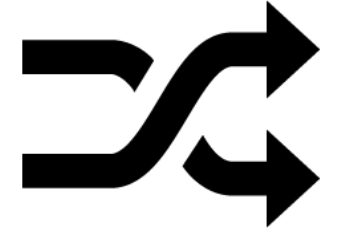
See related article at [www.cmaj.ca/lookup/doi/10.1503/cmaj.180642](http://www.cmaj.ca/lookup/doi/10.1503/cmaj.180642)

# Objective:



- To evaluate the **cost-utility** of CP@clinic compared to 'usual care' in seniors residing in subsidized housing
- What is usual care?
  - 90% are registered to primary health care provider
  - May or may not visit as needed
  - Services offered will depend on the clinic they are rostered to
  - Usually diagnosis/chronic disease management with Family Physician +/- nurse practitioner

# Study Design



- Cost-utility analysis conducted within the context of a large pragmatic cluster randomised controlled trial (RCT)
- With sensitivity analysis
- Data was collected on **Quality of Life** before and after the program, in the same individuals, in intervention and control buildings
- Data from program implementation and operation costs were collected prior to inception and during implementation

# Setting



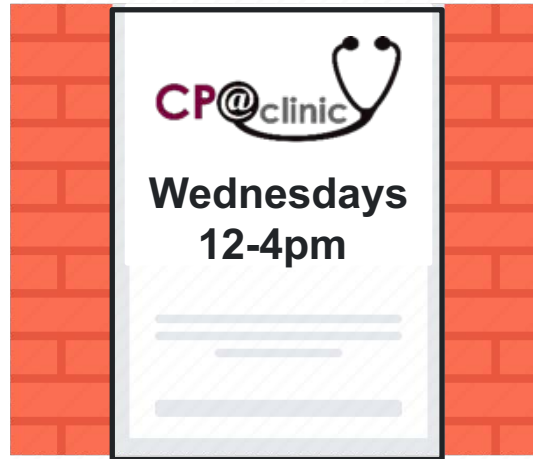
- **32** subsidized seniors' buildings
- Matched by socio-demographics and location (Rural and Urban, Ontario)
- Allocated to intervention (CP@clinic for 1 year) or control (usual care)
- Computer-assisted paired randomization



# Participants and Intervention



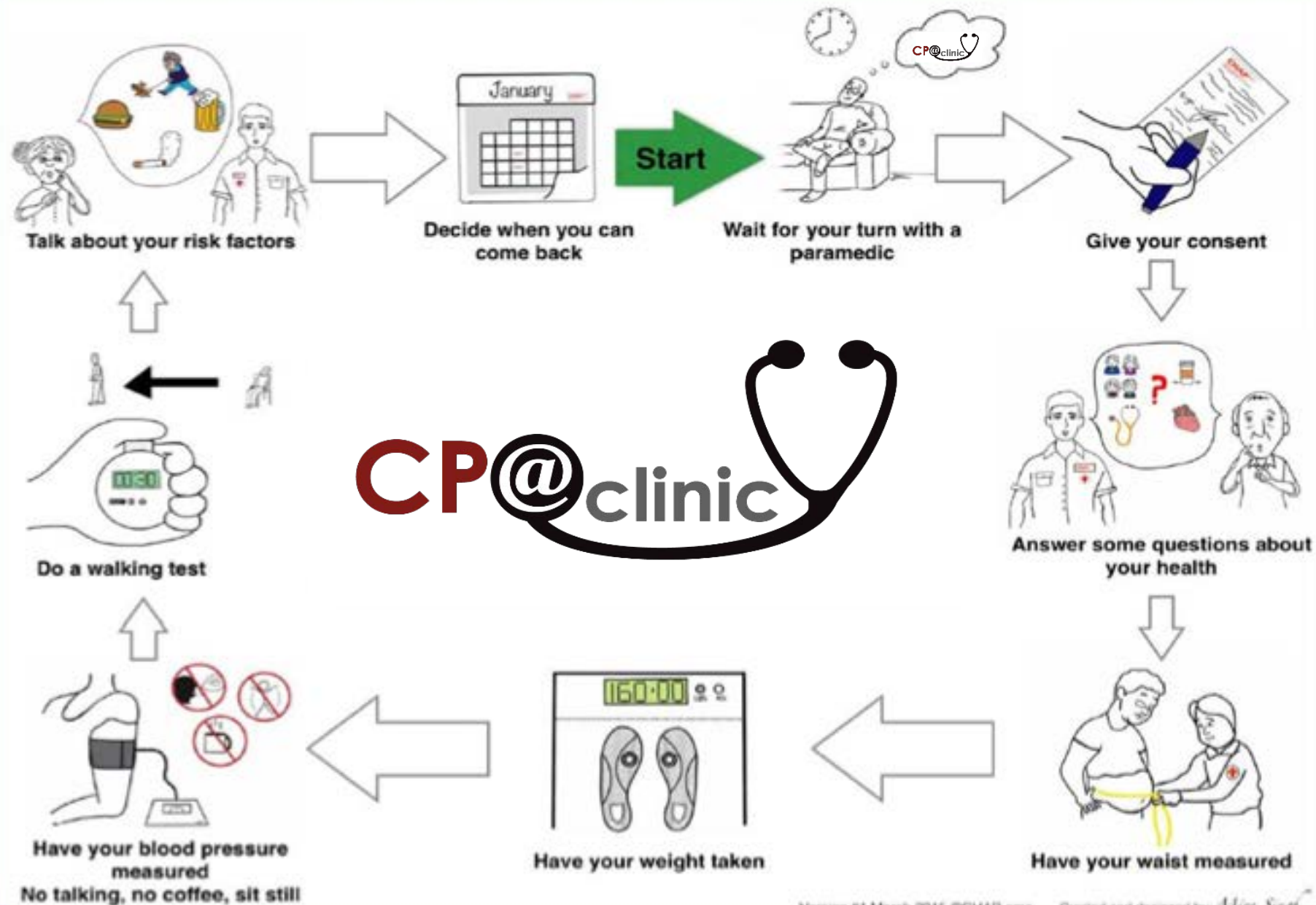
Building residents  
55 years and  
older



Weekly CP@clinic  
risk-assessment & health  
promotion sessions



Delivered in  
common space in  
buildings by CPs





# Outcome Measures

Change in 911 calls



Change in quality of life. This is measured by the **EQ-5D-3L**.

Cost per Quality-Adjusted Life Year (**QALYs**):  
pre- and post- intervention  
change, compared  
between groups

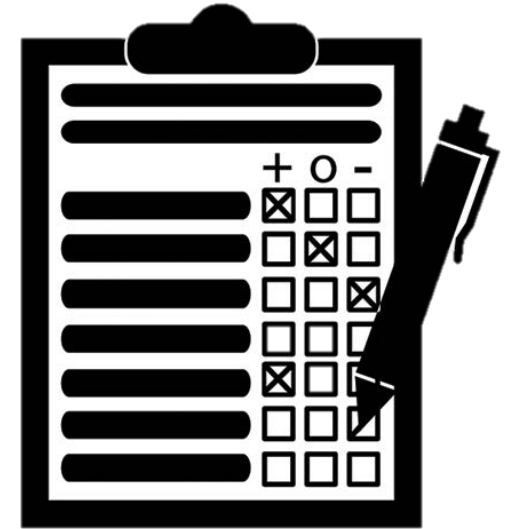


Savings generated by  
reduction in 911 use  
and use of Emergency  
Medical Services  
(estimated)

**QALY:** *generic measure of disease burden, including both the quality and quantity of life lived*

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# Results



- **171** people completed the **EQ-5D-3L** Questionnaire
  - **146** from intervention group
  - **125** from control group
- Consecutive sampling and repeated visits for surveying of intervention and control buildings were carried out, until survey coverage maximised and no further respondents obtained\*

*\*Agarwal et al. Assessing health literacy among older adults living in subsidized housing: a cross-sectional study Canadian Journal of Public Health (2018) 109:401–409*

# Demographics

Demographic	Intervention n=146 (%)	Control n=125 (%)
Mean Age (SD)	74.6 (8.9)	70.2 (7.3)
Female	122 (83.6)	93 (74.4)
Education		
• High School or lower	107 (73.2)	84 (67.2)
• Some College and University	22 (15.1)	25 (20.0)
• College/University	17 (11.6)	16 (12.8)

# Differences in Quality of Life

	Intervention Mean (SD)	Control Mean (SD)	Mean Difference (95% CI)
QALY at baseline	0.65 (0.26)	0.73 (0.20)	<b>-0.08*</b> (-0.13, -0.02)
QALY after 1 year	0.75 (0.18)	0.72 (0.20)	0.03 (-0.10, 0.08)
Unadjusted Mean Difference	0.10 (0.27)	-0.01 (0.18)	<b>0.11*</b> (0.06, 0.17) <b>0.11*</b> (0.06, 0.17)
Adjusted Mean Difference	-----	-----	<b>0.06*</b> ( 0.02, 0.10)

Intervention and Control were found to be significantly different at baseline, so we adjusted for this [consecutive sampling method]

**\*p=0.05**

# Program Costs: Direct

	#1	#2	#3	#4	#5
Space (provided by City Housing)	0	0	0	0	0
Research data repository assumed costs	3000	3000	3000	3000	3000
Equipment:					
Laptop	726	726	726	726	726
Weighing scale	240	295	295	295	295
Tape measure (free resource from Public Health)	5	5	5	5	5
BP machine (Watch BP)	750	750	750	750	750
Glucometer and Lancets and swabs and band aids	150	150	150	150	150
Carry Bag	50	50	50	50	50
Printing/BP cards/Advertising Posters /Flyers	253	253	253	253	253
Yubikey	53	53	53	53	53
Vehicle	6000	5714	5700	5700	4600
Database software	235	235	235	235	235
IT/overheads	500	500	500	500	500
<b>Total direct costs by site</b>	<b>\$11,962</b>	<b>\$11,731</b>	<b>\$11,717</b>	<b>\$11,717</b>	<b>\$10,617</b>
<b>Total direct for whole program</b>	<b>\$57,744</b>				

# Program Costs: Staff

	#1	#2	#3	#4	#5
Modified staff vs Regular	Modified	Both	Regular	Modified	Modified
Number of staff	1	4	1	1	2
Number of buildings (intervention)	4	2	1	1	4
Hours of staff time per week (include training time)	16	8	4	4	16
Cost per hour of staff incl. benefits	54.95	53.33	55	55	54.99
Supervisory Staff Time per week	2	2	2	2	2
Total staff hours per year	900	500	300	300	900
Total cost of staff for year of programming (as though all using regular staff not modified)	\$49455	\$26665	\$16500	\$16500	\$49491
Total staff costs for program	<b>\$158,575</b>				



# Total Program Costs

For Intervention Buildings to have the program:

- Assuming maximal program costs : **\$216,355**
  - With regular non modified staff
  - Assuming sessions run for 4 hours in all sites
  - Program cost per person = **\$364**
- Assuming minimal costs : **\$154,844**
  - By reducing supervisory staff hours by 50%
  - Assuming sessions run for 3 hours in all sites
  - Brings staff costs down to \$112,100.50
  - Removing research data repository costs of \$15,000
  - Program cost per person = **\$260**



# Cost per QALY

- Number of participants who received the program = **595**
- QALY gained per person
  - Unadjusted: **0.11**
  - Adjusted: **0.06**
- Therefore, cost per QALY gain
  - Unadjusted: **\$3,189**
  - Adjusted: **\$5,961**

But could be much lower after accounting for emergency ambulance service/911 avoidance

# Combined Costs



A paramedic visit with  
ambulance sent  
(\$240 - \$785)



An emergency  
department  
transport  
(\$259 - \$627)



Patient assessment  
in the emergency  
department  
(\$842)

Estimated ambulance call cost **averages at \$1,626\*** and  
may range anywhere between **\$499** and **\$2,254.40**

*\*Agarwal et al. BMC Emergency Medicine (2017) 17:8*

# Change in 911 Calls

Site	# of intervention-control building pairs	Total # call decrease(-) /increase(+) in intervention	Total # call decrease(-) /increase(+) in controls	Difference in call change between intervention and control
1	4	-33.4	-21.3	-12.0
2	3	-16.1	-13.3	-2.8
3	4	20.4	51.2	-30.9
4	2	-40.0	-14.0	-25.0
5	2	-1.6	8.0	-9.7

**Mean difference in 911 calls: -10.8 per 100 units (95% CI: -18.5, -3.1) \***

\* Adjusted by building pairs and 911 rates at baseline

# Cost Offset

	#1	#2	#3	#4	#5	Average site
Number of total 911 calls averted over 1 year	12	3	25	10	31	10.8*
Average cost per 911 call	1626	1626	1626	1626	1626	1626
Min cost per 911 call	499	499	499	499	499	499
Max cost per 911 call	2254.4	2254.4	2254.4	2254.4	2254.4	2254.4
Cost offset average	19512	4878	40650	16260	50406	17560.8
Total average cost offset for 5 sites CDN\$	\$13,1706					\$87,804

The avoidance of emergency services use saved an estimated **\$5000 to \$50,000 per service**

\* adjusted by building pairs and 911 call rates at baseline (GEE)

# Cost per QALY gained

Total program costs in 5 RCT sites (sensitivity analysis)	\$ Cost	Actual:* Cost /QALY gained	Adjusted:** Cost/ QALY gained
Maximal operational costs – No 911 costs offset	216,355	3,189	5,961
<i>Maximal operational costs - adjusted 911 cost offsets</i>	<i>128,551</i>	<i>1,895</i>	<i>3,542</i>
<i>Maximal operational costs - maximal 911 cost offsets</i>	<i>84,694</i>	<i>1,248</i>	<i>2332</i>
Minimal operational costs			

\*Actual = raw QALY measured from our survey (0.11)    \*\*Adjusted = adjusted QALY accounting for differences at baseline (0.06)



# Conclusion

- Current Canadian cost per QALY threshold for widespread uptake of a new intervention is undetermined<sup>1</sup>
- Figure used is generally **\$50,000**<sup>1,2</sup>
- CP@clinic cost per QALY is **below** this threshold
- Scale-up across subsidized housing is feasible
- Could result in better Quality of Life (QOL) and reduced Emergency Service (ES) use in low-income seniors
- But clinically what is QOL?



<sup>1</sup> Jaswal. *Valuing Health in Canada*. 2013

<sup>2</sup> Neumann et al. *N Engl J Med* 2014; 371:796-797



# Community Paramedicine

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