

Building Community Paramedicine into the Canadian Healthcare Landscape: An Economic Analysis of 'Community Paramedicine at Clinic' (CP@clinic) from the Paramedic Service Perspective

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President, FirstWatch tstout@firstwatch.net
Cell: 858-395-1728





Guest Speaker:



Dr. Gina Agarwal
Associate Professor,
Department of Family Medicine,
McMaster University
David Braley Health Sciences Centre

gina.agarwal@gmail.com

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Save the Date for Upcoming Webinars

Thursday, December 3 – 10:30am PT (1:30pm ET)

"Developing a National Paramedic Workplace Violence Prevention Framework" Speaker: Steve Sutton

Thursday, January 21 – 10:30am PT (1:30pm ET)

"Mobile Integrated Health"

Speaker: Matthew Crossman

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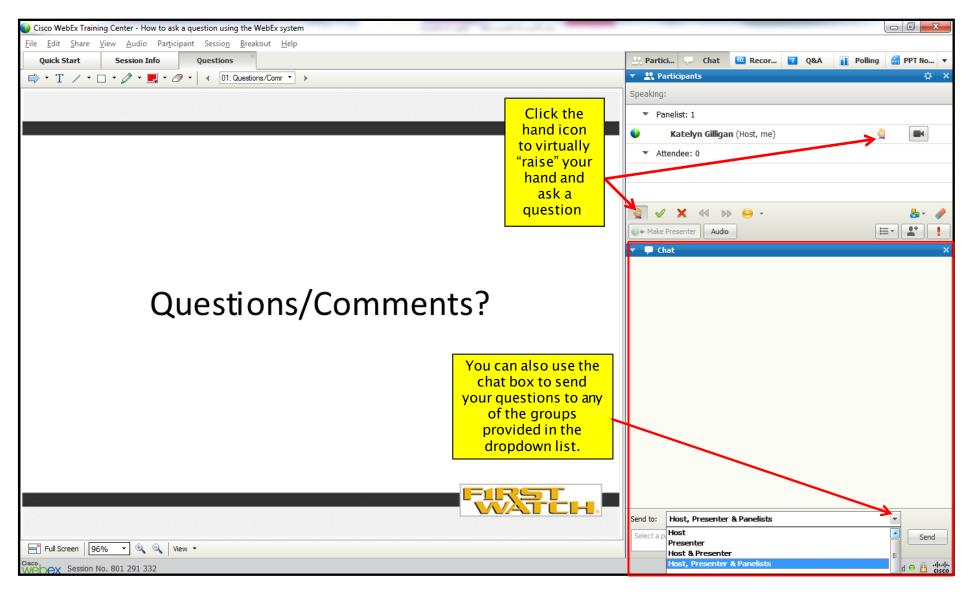
Thank You!

Asking Questions



Paramedic Chiefs of Canada

Chefs Paramédics du Canada





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Building Community Paramedicine into the Canadian healthcare landscape:

An economic analysis of 'Community Paramedicine at Clinic' (CP@clinic) from the paramedic service perspective

Presented by: **Dr. Gina Agarwal**Director of CP@clinic, Professor



Dr. Gina Agarwal

CP@clinic 5°

Director of CP@clinic, Professor

Gina Agarwal is a practicing family physician (MBBS MRCGP CCFP FCFP). She is one of a few family physicians with a PHD in Epidemiology (2011). Dr. Gina Agarwal has facilitated, led and supervised the development of community paramedicine research at McMaster University. She established the CP@clinic Program in Ontario, including all of its program components and scientific evaluation plan (CIHR-funded multi-site randomised controlled trial; 2014 - 2017).

In April of 2019, Dr. Agarwal was awarded Health Care Policy Contribution Program (HCPCP) funding by Health Canada to expand the innovative CP@clinic program with paramedic services across Canada. CP@clinic is the leading evidence-based community paramedicine wellness clinic model and has the potential to benefit communities across Canada.





Objectives of the Webinar

 To learn about evidence from the CP@clinic Randomized Controlled Trial

To understand how the economic analysis was conducted for CP@clinic



About the **CP**@clinic Program

CREDIBLE

CP@clinic is a product of McMaster University's innovative research and endorsed by **Health Canada**.

EVIDENCE-BASED

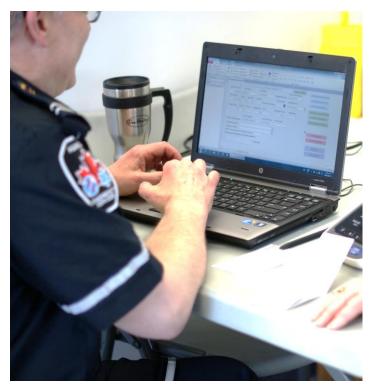
CP@clinic has been implemented & evaluated for 10 years. It is supported by two robust randomized control trials and other scientific evaluations.

RECOGNIZED

CP@clinic is recognized by funders. Automated reports can be generated for quality improvement and to help access funding through the LHINs and other funders.

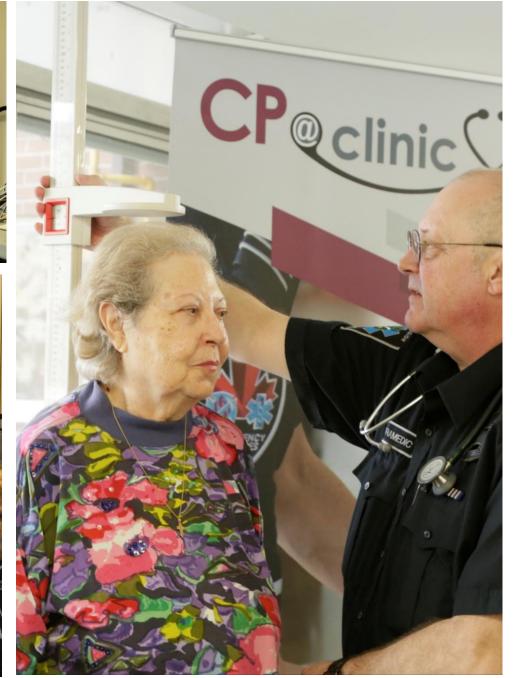
ADAPTABLE

CP@clinic has received Health Care Policy Contribution Program funding from Health Canada to facilitate program expansion & adaptations.











An Evidence-Based Program











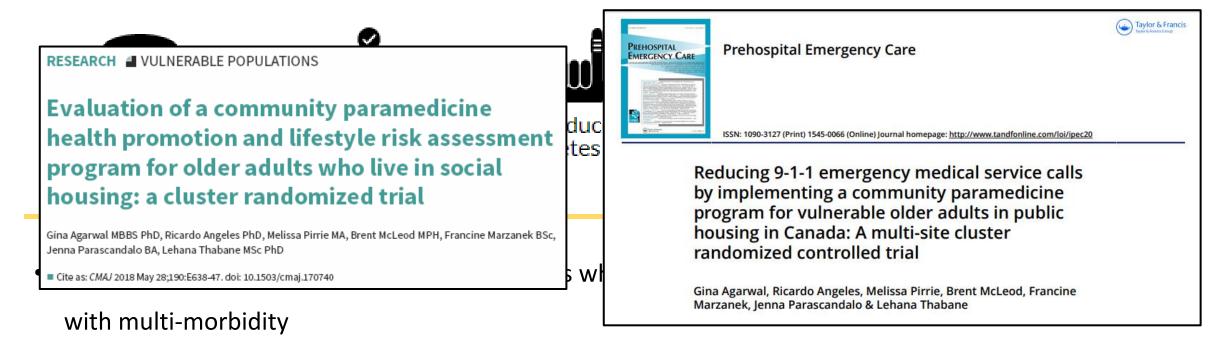


- Focuses on vulnerable low-income older adults who are socially isolated, residing in social housing and with multi-morbidity
- Empowers participants and improves health literacy
- Encourages primary care visits and appropriate healthcare use
- Expands the reach of community paramedicine into primary care



An Evidence-Based Program





- Empowers participants and improves health literacy
- Encourages primary care visits and appropriate healthcare use
- Expands the reach of community paramedicine into primary care







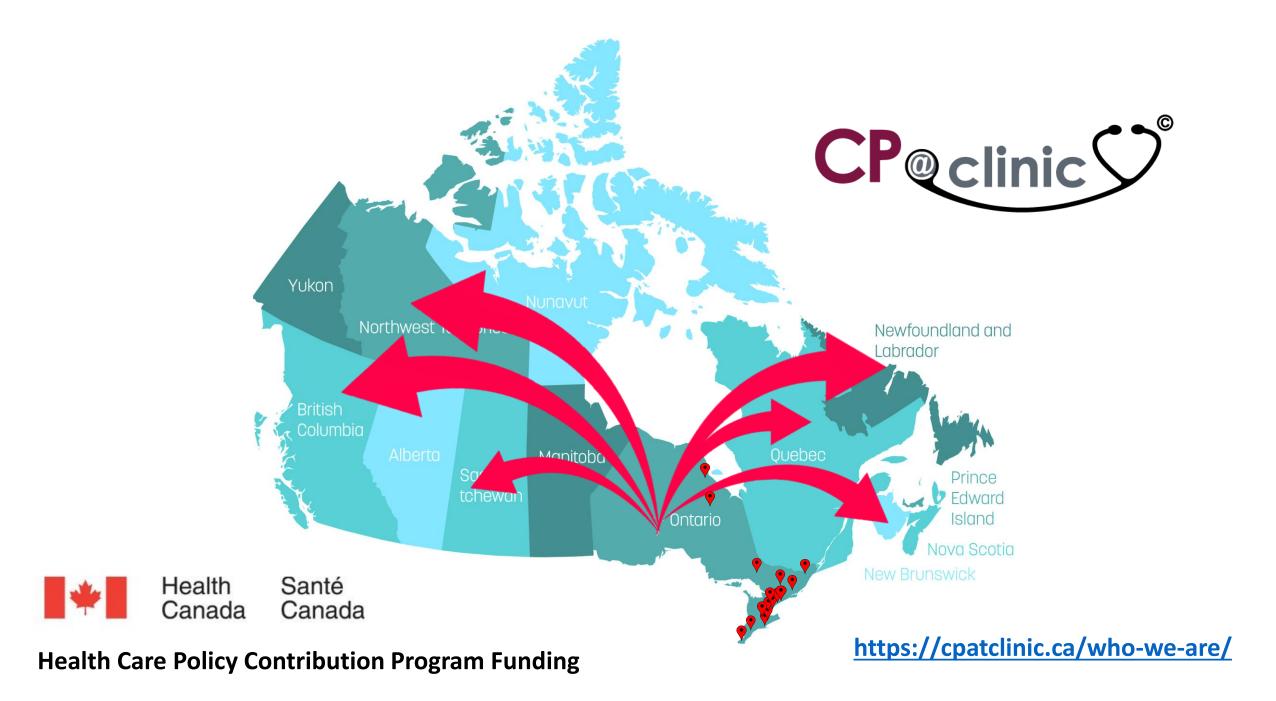


McMaster
Community
Paramedicine
Research Team









Why Do an Economic Analysis?



The program may be beneficial to implement in terms of results





Better blood pressure, better quality of life, less EMS calls....





BUT what did it cost for you - the paramedic service *i.e.* the payer





Economic analysis provides evidence for funders





Methods



Cost-utility analysis of the 1-year CP@clinic RCT



Multiple sensitivity analyses

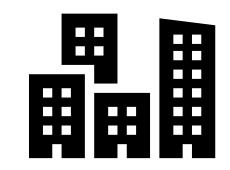


Paramedic service perspective



Methods: Design and Setting

Five Communities, 26 Buildings (13 intervention vs 13 control)



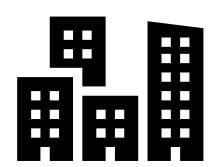




- At least 60% of residents aged 55 years and older
- More than 50 residential units
- Unique postal code
- At least one building of similar size and demographic to form a matched pair
- No exclusion criteria







Key Components of Cost-Utility Analysis

Basic cost-utility analysis:

```
Incremental Cost-Effectiveness Ratio (ICER) = \frac{\text{Costs}}{\text{QALY}} Program and Staffing Costs Quality-adjusted life years gained
```

"What is the cost for each year of high-quality life gained through the intervention?"

Key Components of Cost-Utility Analysis

Basic cost-utility analysis:

Incremental Cost-Effectiveness Ratio (ICER) =
$$\frac{\text{Costs}}{\text{QALY}}$$
 Program and Staffing Costs Quality-adjusted life years gained

"What is the cost for each year of high-quality life gained through the intervention?"

Can also consider cost offsets:

"What is the **net cost** for each year of high-quality life gained through the intervention?"

Data Collection and Results





Demographics

Descriptive Variables	Intervention building n=358 n (%)	Control building n=320 n (%)	Descriptive Variables	Intervention building n=358 n (%)	Control building n=320 n (%)
Age years: mean (SD)	73.90 (9.05)	70.44 (7.94)	Risk Factors	440 (44.0)	466 (54.0)
Female	286 (79.9)	229 (71.6)	Low Physical Activity Low Fruits and Vegetable intake	148 (41.9) 123 (34.6)	166 (51.9) 106 (33.2)
Lives alone	322 (90.7)	287 (90.0)	High Alcohol Intake Smoker	5 (1.4) 87 (24.5)	11 (3.4) 122 (38.4)
Education Some High School or lower High School Diploma Some College/University or Higher College or University	160 (45.1) 83 (23.4) 56 (15.8) 56 (15.8)	146 (45.8) 75 (23.5) 50 (15.7) 48 (15.0)	High BMI Risk of Diabetes Moderate High Health Status and Quality-of-Life	247 (69.6) 104 (39.8) 151 (57.9)	221 (69.0) 98 (42.6) 123 (53.5)
Poor Health Literacy ^a	80 (84.2)	84 (81.6)		135 (38.0)	139 (43.5)
With Chronic Diseases Heart Problems Hypertension High Cholesterol Stroke Diabetes	111 (31.1) 192 (53.6) 135 (37.7) 43 (12.0) 96 (26.8)	80 (25.0) 177 (55.3) 119 (37.2) 39 (12.2) 90 (28.1)	With mobility problems With self-care problems With problems doing usual activities With pain/discomfort With anxiety/depression	218 (61.4) 83 (23.4) 166 (46.8) 249 (70.1) 176 (48.5)	192 (60.0) 59 (18.4) 133 (41.6) 239 (74.9) 154 (48.1)
2142666	33 (20.0)	33 (20.1)	Has a Family Doctor	327 (91.3)	298 (93.1)





Data Collection: Program Costs

- Detailed records were kept of all materials required for program implementation and validated with the community paramedicine (CP) supervisors
- Costs collected from the source from which the service, object or goods were obtained
- Fixed costs number of buildings has minimal impact (e.g. laptop)

Results: CP@clinic Program Costs

Table 3	Direct programme costs in Canadian dollars
(excludin	g staffing)

Item	Source	Cost per site (\$C in 2016)
Space	Housing authority of each community	In-kind
Vehicle incl. fuel and maintenance	Paramedic service of each community	10000
Information technology supports and overheads	McMaster University, DFM IT	500
Database software	McMaster University, DFM IT	235
YubiKey	McMaster University, DFM IT	53
Printing and materials (eg, posters, flyers, BP record card)	McMaster University Media Services	253

Session equipment				
Laptop	McMaster University, DFM IT	726		
Weighing scale	Medical supply vendor	240		
Tape measure	Medical supply vendor	5		
BP machine (WatchBP Office)	Medical supply vendor	750		
Glucometer, lancets, swabs, bandages	Paramedic service of each community	150		
Carry bag	Office supply vendor	50		
Direct programme cos	12962			
Total direct programme costs for all five RCT 64810 study sites				

BP, blood pressure; DFM IT, Department of Family Medicine - Information Technology team; RCT, randomised controlled trial.





Data Collection: Staffing Costs

- Hours and salary levels verified with paramedic services
- Costs of paramedic hourly salary with benefits obtained from paramedic services implementing CP@clinic
- Combined hourly cost of supervision + administration within paramedic service to oversee the CPs → est. 200% of paramedic hourly salary with benefits





Total staffing costs as implemented during RCT (5 sites)

Results: Actual Staffing Costs

Additional paramedic staff*

Number of buildings implementing CP@clinic

13

Cost of additional paramedic staff per year (50 weeks, hourly salary including benefits ranged from \$50.33 to \$54.99 per hour)

Actual: as implemented during the trial \$31 130

Minimum: two paramedics on modified duties -

 Moderate: one funded CP, one paramedic on modified duties

Maximum: two funded CPs

Additional supervision and administration

Cost of additional supervisory and administrative staff hours per year (50 weeks)

Actual: as implemented during the trial \$32 522

Minimum: 1 hour per week

▶ Moderate: 1.5 hours per week –

Maximum: 2 hours per week

Other staffing (programme evaluation, data repository, training development)

Cost of other staffing (\$3000/year base cost)

Actual: as implemented during the trial \$0

 Minimum: funded entirely from external source or – in-kind

▶ Moderate: 50/50 mixed funding model -

 Maximum: funded entirely by the paramedic – service

Totals

Actual costs during RCT (five sites)
 \$63 652

Minimum assumption scenarios (one site)

Moderate assumption scenarios (one site)

Maximum assumption scenarios (one site)

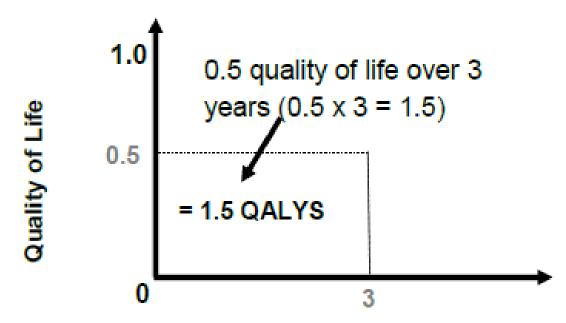


Data Collection: Outcome - QALY

QALY: Quality-Adjusted Life Year *Gold Standard in Health Economics*

- Examines <u>quantity</u> of life lived
 - years, months
- against health-related <u>quality</u> of life
 - where 1.0 represents perfect health
 and 0 represents death

EXAMPLE:



Quantity of Life (yrs)



Data Collection: Quality of Life Measurement

- Quality of Life Measurement Tool
- Immediately before and after RCT
- All building residents could complete the survey (not just attendees)
 - 55 years and older
 - Invitation posters displayed throughout the building
 - Flyers handed out to residents
- Consecutive sampling method (difficulty surveying vulnerable population)
- On completion, the participants were provided with \$10 local grocery store gift card



Results: QALY

Table 2 Difference in QALY for intervention and control buildings			
	Intervention building residents vs control buil residents		
	Intervention mean (SD)	Control mean (SD)	Mean difference (95% CI)
Main trial results with multiple imputation (intention-to-treat)	n=358	n=320	
Adjusted* QALY: QALY, regression adjusted for baseline utility score and building pairing	0.72 (0.11)	0.69 (0.20)	0.03† (0.01 to 0.05)

^{*}Intervention and control QoL index scores were found to be significantly different at baseline, despite randomisation, therefore baseline differences were accounted for by adjustment using regression. †p<0.05.

QALY, quality-adjusted life year.



Result: Incremental Cost Effectiveness Ratio (ICER)

QALY gain:

0.03 per resident

Costs:

Program: \$64,810

Staffing: \$65,632

Total: \$128,462 *or \$88/resident*

$$\frac{|CER|}{|CER|} = \frac{|COST|}{|CER|} = \frac{|S2933|}{|CER|}$$
QALY QALY

Common threshold is \$50,000/QALY



Can also consider Cost Offset

- Estimated cost of an EMS call:
 - Minimum: \$499/call
 - Moderate: \$1626/call
 - Maximum: \$2254/call
- Since the paramedic service perspective has been taken, the healthcare costs examined in this paper **do not go beyond the EMS call** (e.g. hospital admissions, duration of stay, specialist visits)



Results: EMS calls

- Reduction in EMS calls
 - From RCT results published in Pre-Hospital Emergency Care
 - 0.9 calls/100 units/month
 - Since the intervention buildings had 1461 units, it can be estimated that <u>157.8 EMS calls</u> were avoided during the intervention period

1.

Agarwal G, Angeles R, Pirrie M, McLeod B, Marzanek F, Parascandalo J, et al. Reducing 9-1-1 Emergency Medical Service Calls By Implementing A Community Paramedicine Program For Vulnerable Older Adults In Public Housing In Canada: A Multi-Site Cluster Randomized Controlled Trial. Prehosp Emerg Care. 2019 Jan 9:1–12.



ICER Sensitivity Analysis: EMS Call Offset

Bringing it all together:

Reduction of 157.8 calls

Negative ICER

- Saves more \$ than the program costs
- "Intervention Dominant"

carac programme, intervention in 20	To Canadian donars		
QALY change per resident	0.03		
Programme cost per resident for full RCT (direct costs and staffing of \$128462 for 1461 units)	\$88		
Base case ICER (programme cost per QALY)	\$2933		
Analysis including potential cost offset due to EMS call reduction*			
Minimum assumption: \$499/EMS call			
Cost offset per resident	(-\$54)		
ICER (cost per QALY)	\$1133		Minimum
Moderate assumption: \$1626/EMS call			TVIII III III III
Cost offset per resident	(-\$176)		
ICER (cost per QALY)	(-\$2933) (intervention dominant)	•	Moderate
Maximum assumption: \$2254/EMS call			
Cost offset per resident	(-\$243)		
ICER (cost per QALY)	(-\$5167) (intervention dominant)	•	Maximum
*Reduction of 10.8 EMS calls per 100 res	idents.	•	

^{*}Reduction of 10.8 EMS calls per 100 residents. EMS, emergency medical service; ICER, incremental costeffectiveness ratio; QALY, quality-adjusted life year; RCT, randomised controlled trial.

Table 5 Cost-utility analysis of community paramedicine at clinic programme. Intervention in 2016 Canadian dollars



Hypothetical Sites





Different Staffing Models

Hypothetical analyses based on **actual costs** in <u>3 different paramedic</u> resource scenarios in different numbers of buildings:

	Model 1 (minimum)	Model 2 (moderate)	Model 3 (maximum)
Paramedic Staff	2 modified	1 modified/ 1 dedicated	2 dedicated
Supervision/Administration	1 hour	1.5 hours	2 hours
Other Staffing (Evaluation, Data Repository, Training, etc.)	In-Kind	50%	100%





Total staffing costs as implemented during RCT (5 sites)

Potential staffing costs for a future site costs for a future with 2 buildings

Potential staffing site with 4 buildings

Additional paramedic staff*

Number of buildings implementing CP@clinic

Cost of additional paramedic staff per year (50 weeks, hourly salary including benefits ranged from \$50.33 to \$54.99 per hour)

13

Actual: as implemented during the trial \$31 130

Minimum: two paramedics on modified duties

Moderate: one funded CP, one paramedic on modified duties

Maximum: two funded CPs

Additional supervision and administration

Cost of additional supervisory and administrative staff hours per year (50 weeks)

Actual: as implemented during the trial \$32522

Minimum: 1 hour per week

Moderate: 1.5 hours per week

Maximum: 2 hours per week

Other staffing (programme evaluation, data repository, training development)

Cost of other staffing (\$3000/year base cost)

Actual: as implemented during the trial \$0

Minimum: funded entirely from external source or in-kind

Moderate: 50/50 mixed funding model

Maximum: funded entirely by the paramedic service

Totals

Actual costs during RCT (five sites) \$63652

Minimum assumption scenarios (one site)

Moderate assumption scenarios (one site)

Maximum assumption scenarios (one site)

University :::





Total staffing costs as implemented during RCT (5 sites) Potential staffing costs for a future site costs for a future with 2 buildings

Potential staffing site with 4 buildings

Additional paramedic staff*

Number of buildings implementing CP@clinic

Cost of additional paramedic staff per year (50 weeks, hourly salary including benefits ranged from \$50.33 to \$54.99 per hour)

13

Actual: as implemented during the trial

\$31 130

Minimum: two paramedics on modified duties

\$21996

\$0

Moderate: one funded CP, one paramedic on

modified duties

\$43992

Additional supervision and administration

Maximum: two funded CPs

Cost of additional supervisory and administrative staff hours per year (50 weeks)

Actual: as implemented during the trial

\$32522

\$5499

Minimum: 1 hour per week

Moderate: 1.5 hours per week

\$8249

Maximum: 2 hours per week

\$10998

\$0

Other staffing (programme evaluation, data repository, training development)

Cost of other staffing (\$3000/year base cost)

Actual: as implemented during the trial

\$0

Minimum: funded entirely from external source or

in-kind

Moderate: 50/50 mixed funding model

\$1500

Maximum: funded entirely by the paramedic service

\$3000

Totals

Actual costs during RCT (five sites)

\$63652

Minimum assumption scenarios (one site)

\$5499 \$31745

Maximum assumption scenarios (one site)

Moderate assumption scenarios (one site)

\$57990

Family Medicine



CP@clinic	Total staffing costs as implemented during RCT (5 sites)	Potential staffing costs for a future site with 2 buildings	Potential staffing costs for a future site with 4 buildings
Additional paramedic staff*			
Number of buildings implementing CP@clinic	13	2	4
Cost of additional paramedic staff per year (50 weeks, I	nourly salary including b	enefits ranged from \$50.	33 to \$54.99 per hour)
 Actual: as implemented during the trial 	\$31 130	7.1	=
► Minimum: two paramedics on modified duties	2	\$0	\$0
 Moderate: one funded CP, one paramedic on modified duties 	=	\$21996	\$43992
Maximum: two funded CPs	-	\$43992	\$87984
Additional supervision and administration			
Cost of additional supervisory and administrative staff h	nours per year (50 weeks	s)	
 Actual: as implemented during the trial 	\$32522	-	Ŧ
 Minimum: 1 hour per week 	-	\$5499	\$5499
Moderate: 1.5 hours per week	-	\$8249	\$8249
▶ Maximum: 2 hours per week	_	\$10998	\$10998
Other staffing (programme evaluation, data reposito	ry, training developme	ent)	
Cost of other staffing (\$3000/year base cost)			
► Actual: as implemented during the trial	\$0	-	=
 Minimum: funded entirely from external source or in-kind 	₩	\$0	\$0
► Moderate: 50/50 mixed funding model	-	\$1500	\$1500
 Maximum: funded entirely by the paramedic service 	-	\$3000	\$3000
Totals			
 Actual costs during RCT (five sites) 	\$63 652	-	=
 Minimum assumption scenarios (one site) 	-	\$5499	\$5499
 Moderate assumption scenarios (one site) 	-	\$31745	\$53741 Far
 Maximum assumption scenarios (one site) 	-	\$57990	\$101982



Hypothetical Projections for CP@clinic Only

CP	@clinic \mathcal{S}°	Potential programme of and staffing)	costs-two intervention	buildings (direct costs
		Minimum assumption (\$18461)	Moderate assumption (\$44707)	Maximum assumption (\$70952)
Potential cost	Minimum assumption (\$12114)	6347	32 593	58 838
offsets*	Moderate assumption (\$39474)	(-21013)	5233	31 478
	Maximum assumption (\$54720)	(-36259)	(-10013)	16232
		Potential programme of and staffing)	costs-four intervention	buildings (direct costs
		Minimum assumption (\$18461)	Moderate assumption (\$66 703)	Maximum assumption (\$114944)
Potential cost	Minimum assumption (\$24228)	(-5767)	42 475	90716
offsets†	Moderate assumption (\$78,949)	(-60488)	(-12246)	35995
	Maximum assumption (\$109440)	(-90979)	(-42737)	5504

^{*}Expected offset for two future buildings, based on the randomised controlled trial results of 157.8 fewer calls in 13 buildings, and a value of \$499/call for minimum, \$1626/call for moderate and \$2254/call for maximum cost offset assumptions.



[†]Expected offset for four future buildings, based on the randomised controlled trial results of 157.8 fewer calls in 13 buildings, and a value of \$499/call for minimum, \$1626/call for moderate and \$2254/call for maximum cost offset assumptions.

QALY, quality-adjusted life year.

Conclusion







Cost-effectiveness of the CP@clinic \(\)



Program

Costs



Data from the CP@clinic Multi-Site Randomized Controlled Trial Based on 13 social housing buildings & 1461 residents

For every

spent on

the CP@clinic Program,

the Emergency Care System

sees



in benefits!



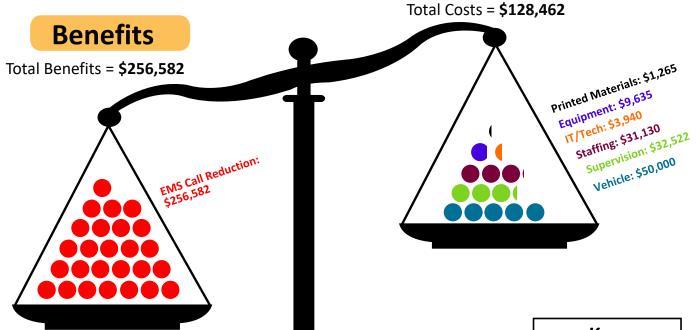
Net Savings Per Resident:

\$88

Program Cost Per QALY is well below the threshold for program adoption in

QALY= Quality-Adjusted Life Year

Canada



BENEFIT TO COST RATIO

Net Gain = \$128,120

2:1

Key:

= \$10,000





Family Medicine

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In association with





Q&A and Thank You

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