

Pharmacist intervention in hypertension management

A cost-effectiveness analysis

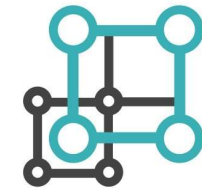


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Study team

- Carlo Marra, B.Sc.(Pharm.), PharmD, PhD
- Ross Tsuyuki, B.Sc.(Pharm.), Pharm.D., M.Sc.
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Study sponsorship



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CARLO MARRA

We pursued this research because the evidence base on the clinical benefits of pharmacist intervention for hypertension is robust, but little is known about the value-for-money proposition.

Nous avons mené cette étude, car il y a de solides preuves des avantages de l'intervention des pharmaciens en matière d'hypertension, mais peu de données sur la rentabilité de cette pratique.

Cost-effectiveness of pharmacist care for managing hypertension in Canada

Carlo Marra, PharmD, PhD, ACPR, FCSHP; Karissa Johnston, MSc, PhD;
Valerie Santschi, PharmD, PhD; Ross T. Tsuyuki, BSc(Pharm), PharmD, MSc, FCSHP, FACC

ABSTRACT



Background: More than half of all heart disease and stroke are attributable to hypertension, which is associated with approximately 10% of direct medical costs globally. Clinical trial evidence has demonstrated that the benefits of pharmacist intervention, including education, consultation and/or prescribing, can help to reduce blood pressure; a recent Canadian trial found an 18.3 mmHg reduction in systolic blood pressure associated with pharmacist care and prescribing. The objective of this study was to evaluate the economic impact of such an intervention in a Canadian setting.

Methods: A Markov cost-effectiveness model was developed to extrapolate potential differences in long-term cardiovascular and renal disease outcomes, using Framingham risk equations and other published risk equations. A range of values for systolic blood pressure reduction was considered (7.6-18.3 mmHg) to reflect the range

of potential interventions and available evidence. The model incorporated health outcomes, costs and quality of life to estimate an overall incremental cost-effectiveness ratio. Costs considered included direct medical costs as well as the costs associated with implementing the pharmacist intervention strategy.

Results: For a systolic blood pressure reduction of 18.3 mmHg, the estimated impact is 0.21 fewer cardiovascular events per person and, discounted at 5% per year, 0.3 additional life-years, 0.4 additional quality-adjusted life-years and \$6,364 cost savings over a lifetime. Thus, the intervention is economically dominant, being both more effective and cost-saving relative to usual care.

Discussion: Across a range of one-way and probabilistic sensitivity analyses of key parameters and assumptions, pharmacist intervention remained both effective and cost-saving.

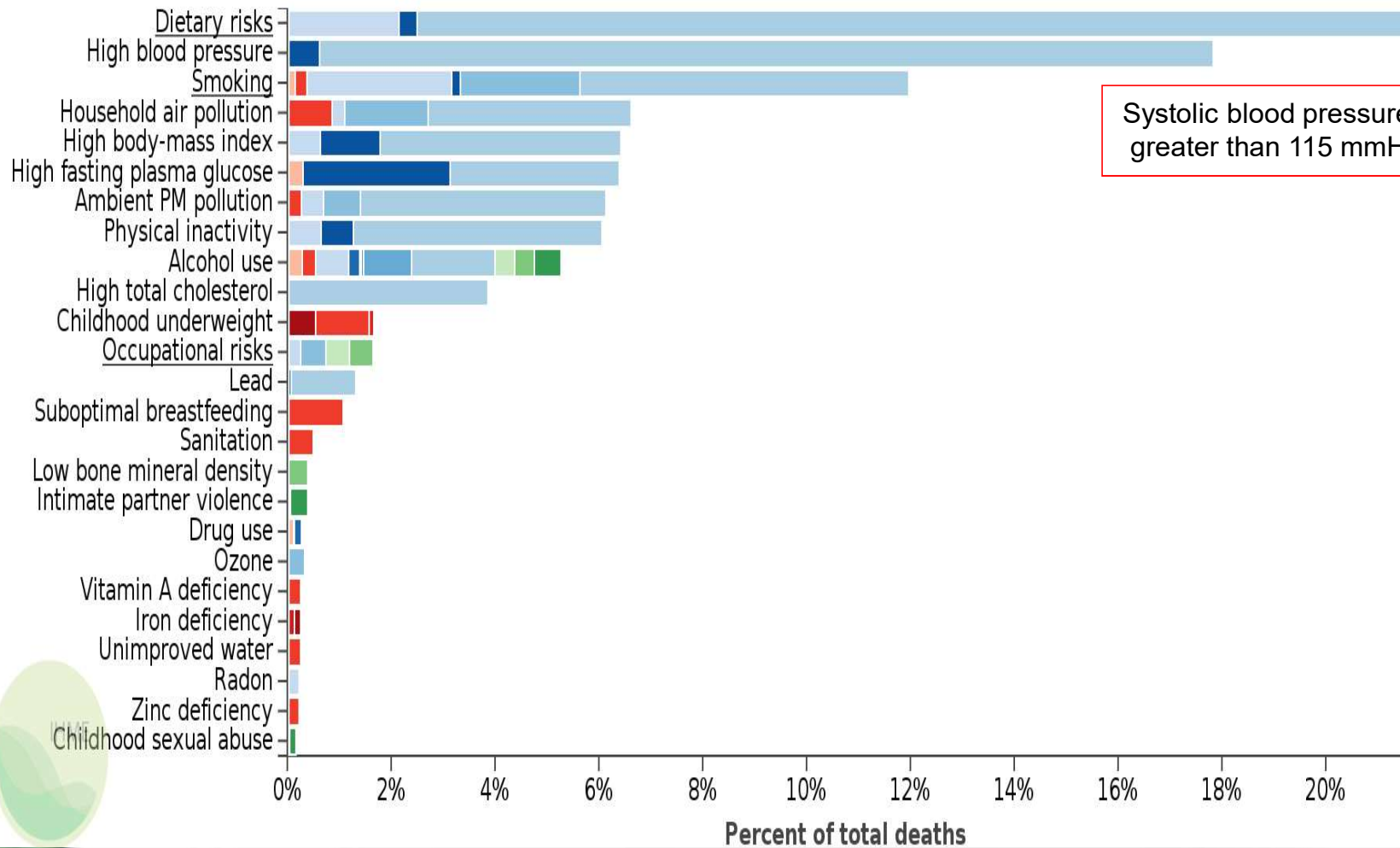
Conclusion: Comprehensive pharmacist care of hypertension, including patient education and prescribing, has the potential to offer both health benefits and cost savings to Canadians and, as such, has important public health implications. *Can Pharm J (Ott)* 2017;150:184-197.



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Global, deaths
Both sexes, All ages, 2010



Systolic blood pressure greater than 115 mmHg

Figure obtained by cropping a downloaded figure from <http://www.healthdata.org> July 8 2014

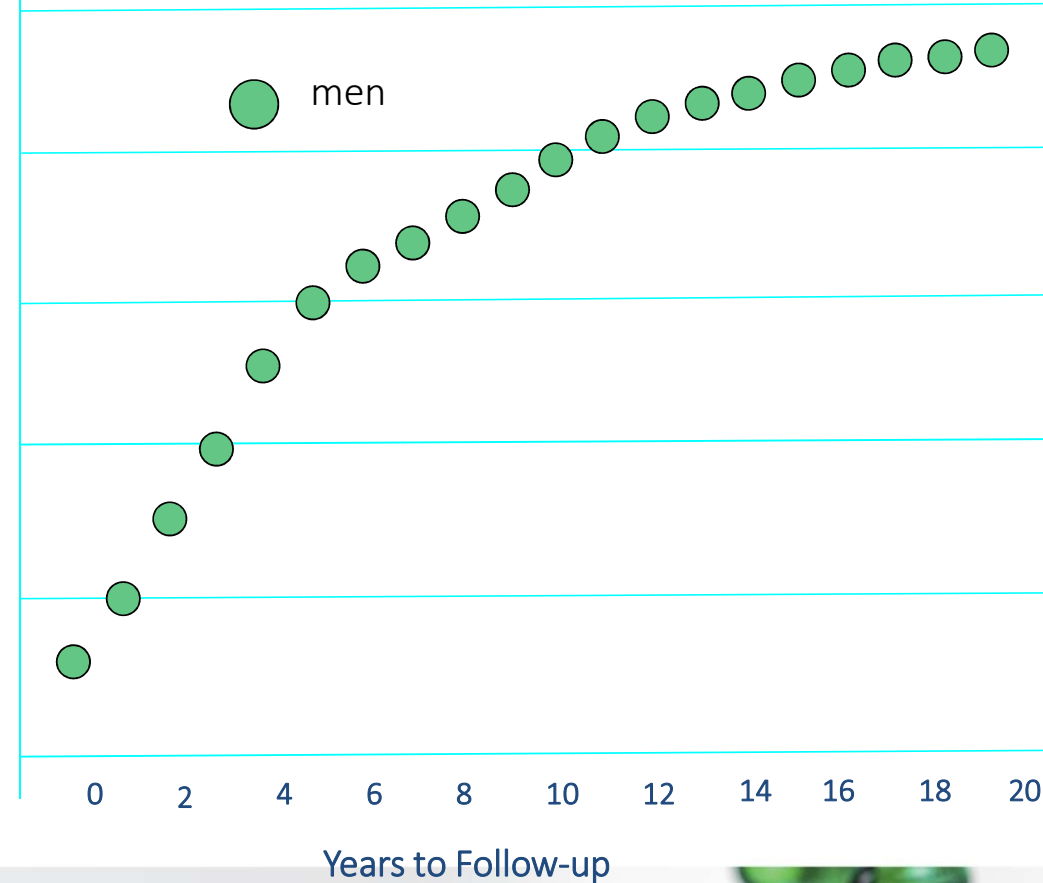
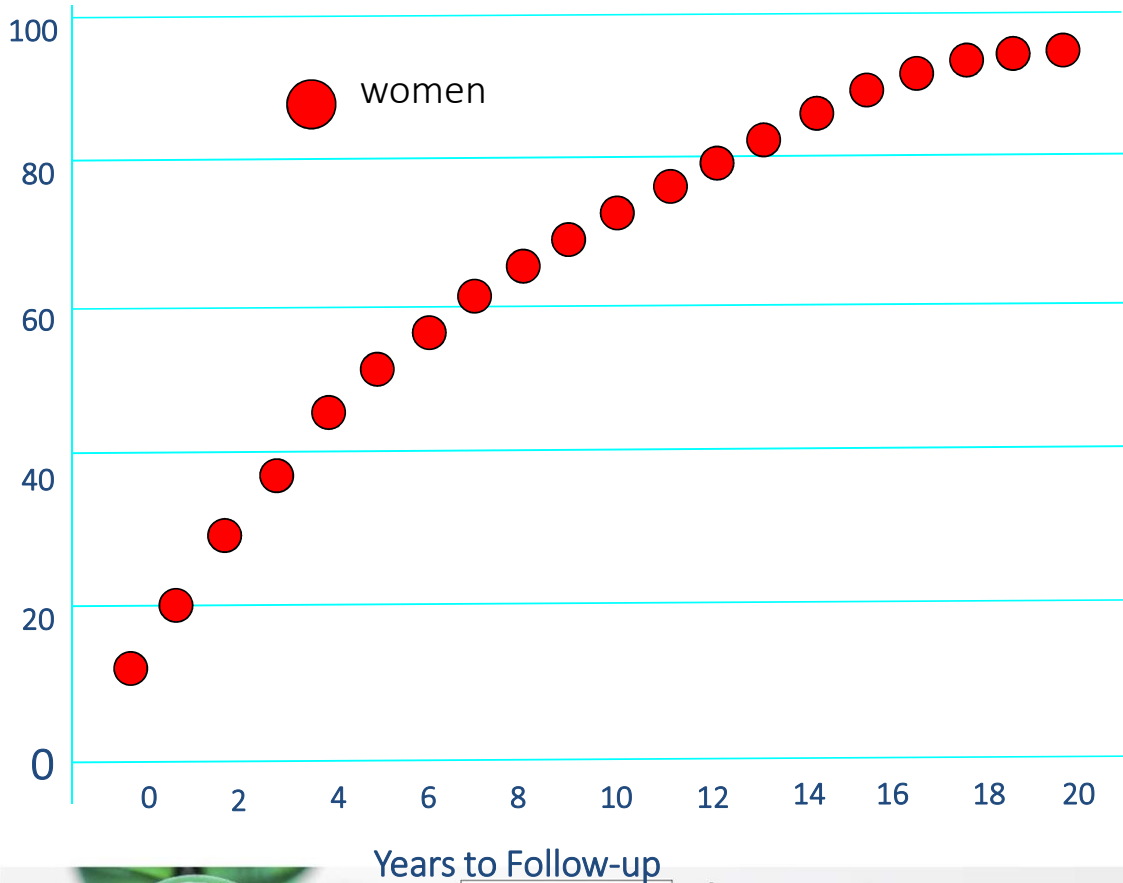


Life time risk of Hypertension in Normotensive Women and Men aged 55-65 years

Risk of Hypertension %

JAMA 2002: Framingham data.

Hypertension



Years to Follow-up

Years to Follow-up



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The burden of hypertension as a risk factor

- Attributable Risk
 - Overall 1/2 of heart and stroke*
 - Stroke 54%*
 - Heart failure 50%
 - Heart attack 25%
 - Kidney failure 25%
 - *Dementia*

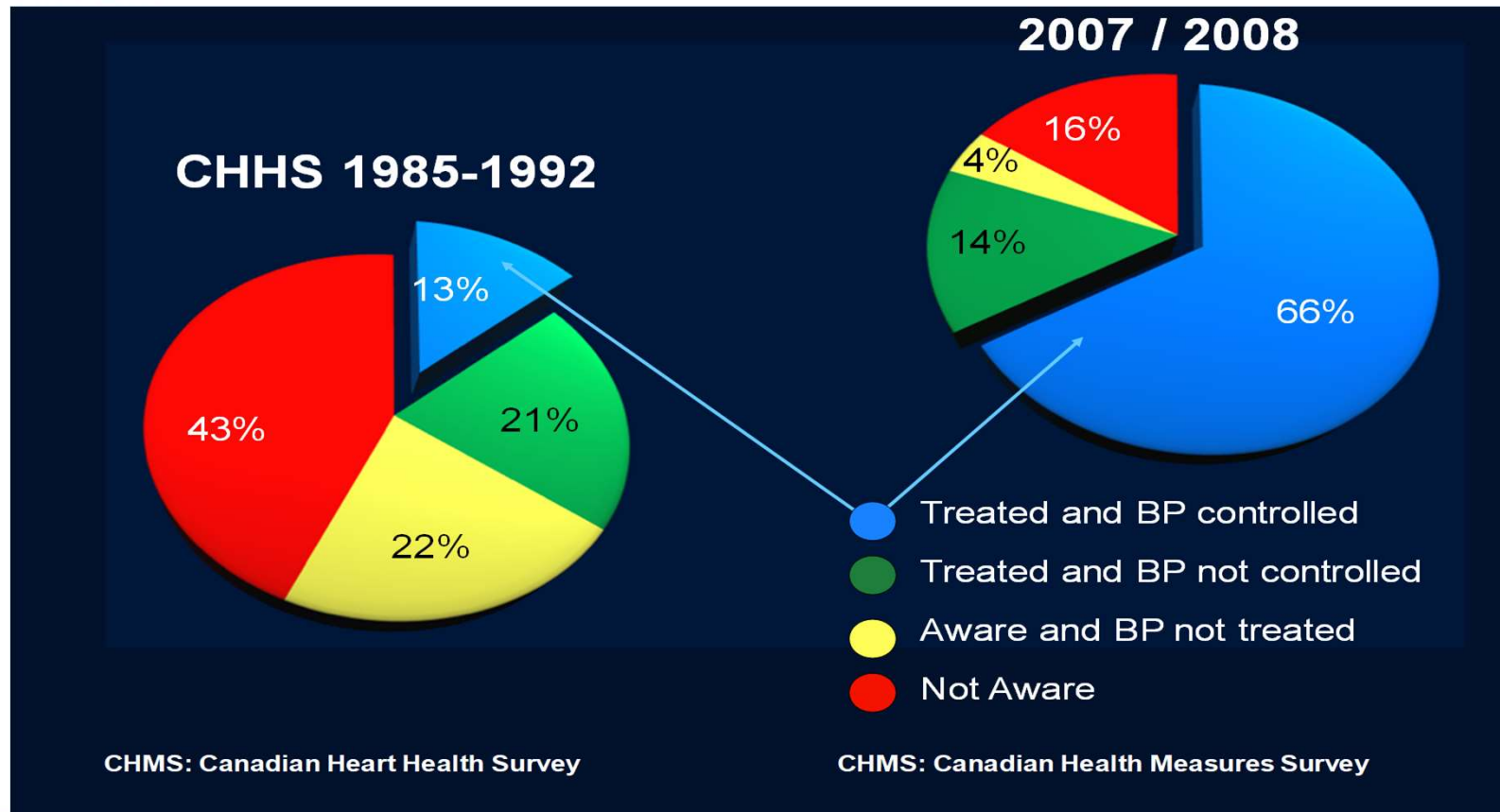
* Systolic blood pressure greater than 115 mmHg



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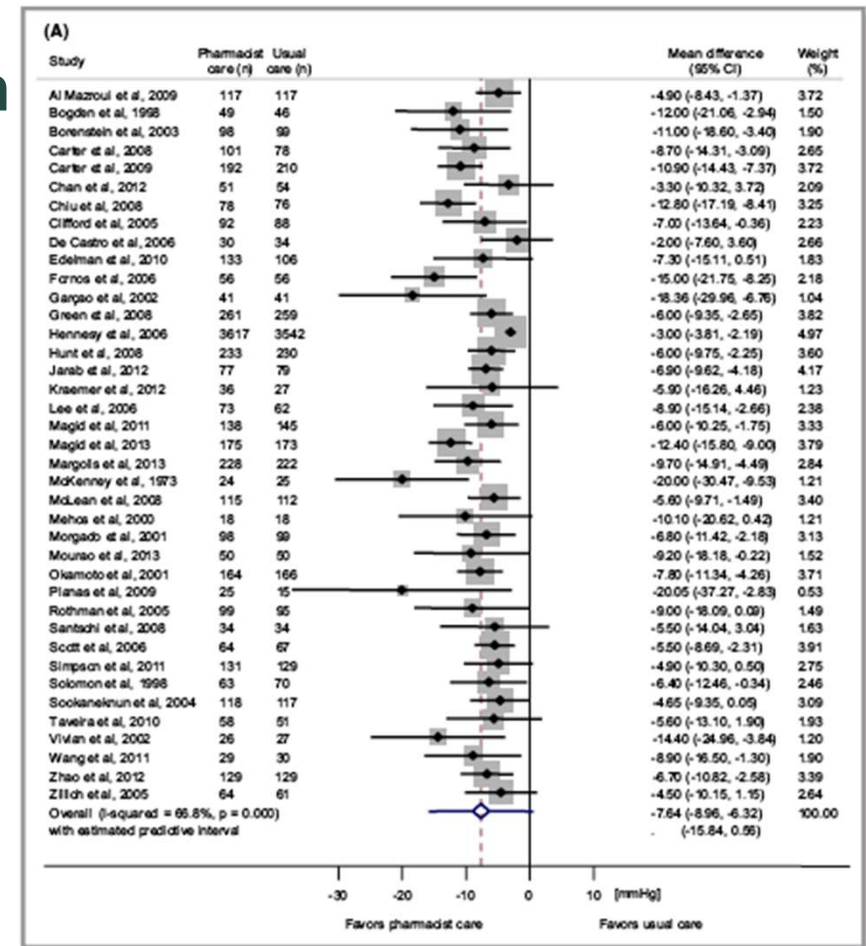
Current and past management of hypertension in Canada



Pharmacist Care: Hypertension

- 39 RCTs
- 14,224 patients
- Effect on blood pressure:
 - 7.6 (95% CI -9.0 to -6.3) mmHg
 - 3.9 (95% CI -5.0 to -2.8) mmHg
- Greater effects if pharm-led and monthly follow-up

Santschi V, *et al.* J Am Heart Assoc 2014; 3: e000718
 Santschi V, *et al.* Can Pharm J 2015; 148(1): 13-16.



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Pharmacist Prescribing in Hypertension: R_xACTION



- **Background:** Blood pressure control in the community is poor (30-90% uncontrolled)
- **Objective:** To evaluate the effect of pharmacist prescribing on systolic BP reduction in patients with poorly controlled hypertension
- **Methods:**
 - Randomized trial conducted in 23 pharmacies in Alberta
 - Patients: 248 patients with BP >140/90 or 130/80 mmHg recruited by the pharmacist
 - Intervention: pharmacist assessment of BP, CV risk, patient education, prescribing, lab monitoring, monthly follow-up according to the Hypertension Canada guidelines
 - Control: usual pharm and physician care (written educational materials and BP wallet card) – an ‘active’ control group

Tsuyuki RT, *et al.* Circulation 2015;132:93-100



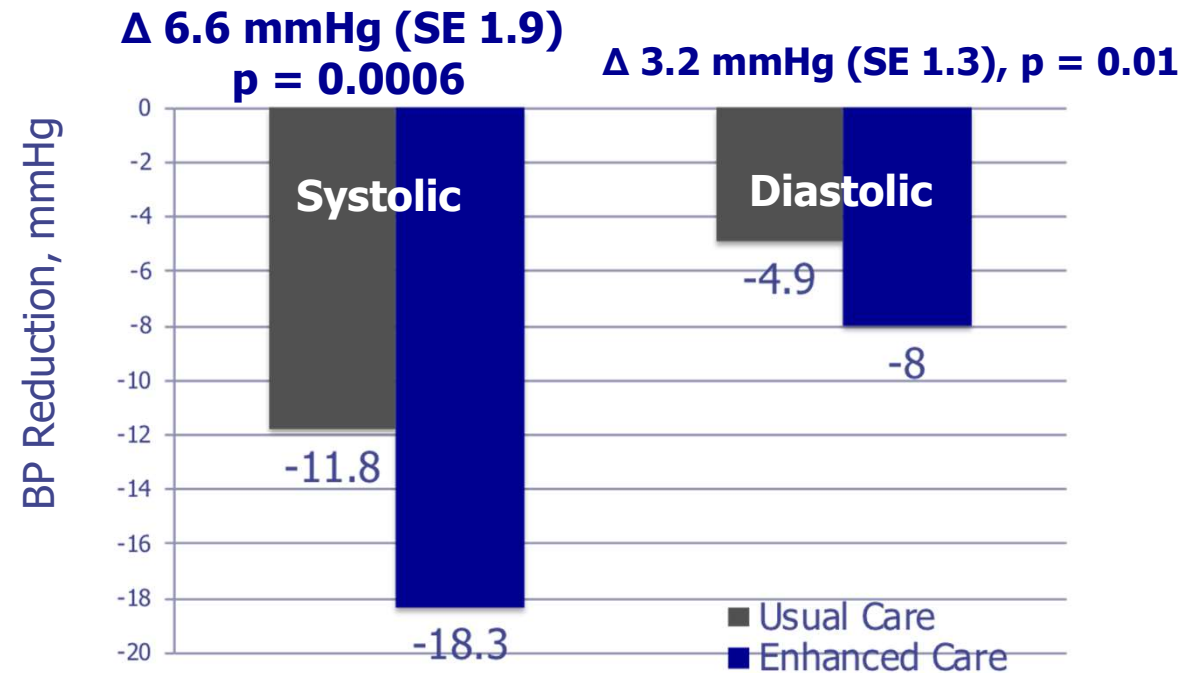
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R_xACTION Results



Tsuyuki RT, *et al.* Circulation 2015;132:93-100



- Adjusted odds of achieving target BP 2.32 (95% CI 1.17, 4.15) in favour of intervention

Economic Evaluation of Pharmacist-Managed Hypertension

- Objective: To evaluate the cost-effectiveness of pharmacist prescribing in hypertension
- Methods:
 - Used R_xACTION results

Costs:

Pharmacist training
Pharmacist payments
Drug costs



Benefits (\$):

Reduced strokes
Reduced myocardial infarctions
Reduced kidney failure



- Scale-up to a population level

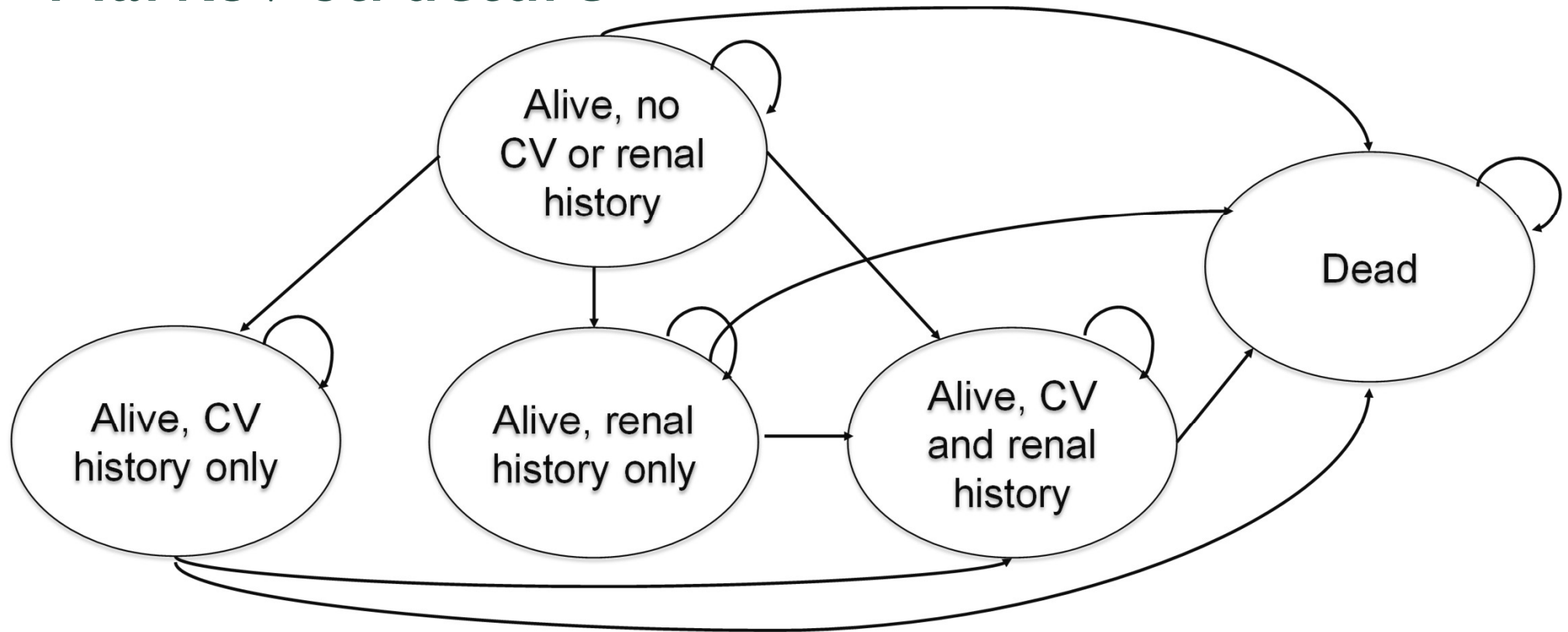
Marra C, Johnston K, Santschi V, Tsuyuki RT. Can Pharm J 2017; 150(3): 184-197.



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Markov structure



Baseline characteristics

- Based on Tsuyuki et al. trial population

Characteristic	Value
Age (years)	63.5
Sex (% male)	48.8
Systolic blood pressure (mm Hg)	149.5
Diastolic blood pressure (mm Hg)	83.7
Treatment for hypertension (%)	77.8
Smoking (%)	16.5
Diabetes mellitus (%)	44.0
BMI	32.0

30-year cardiovascular risk score: 21.1%

ESRD incidence rate: 19.5 per 100,000 person-years



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Impact of pharmacist intervention

- Pharmacist prescribing (Tsuyuki et al. trial)
 - Change in systolic blood pressure, intervention arm: **-18.3 mmHg**



Relative risk for cardiovascular disease: 0.50



Relative risk for renal disease: 0.77

- Pharmacist intervention (Santschi et al. meta-analysis)

- Change in systolic blood pressure, intervention arm: **-7.6 mmHg**



Relative risk for cardiovascular disease: 0.77



Relative risk for renal disease: 0.98



Lifetime clinical outcomes per individual

- Pharmacist prescribing

Outcome	Usual care	Pharmacist prescribing	Difference
CVD	0.61	0.40	-0.21
Renal disease	0.0039	0.0031	-0.0008
Life years (undiscounted)	19.96	20.73	0.76
QALYs (undiscounted)	16.47	17.42	0.95

 Reduce one case of CVD for every 5 individuals treated

- Pharmacist intervention

Outcome	Usual care	Pharmacist intervention	Difference
CVD	0.61	0.53	-0.08
Renal disease	0.0039	0.0031	0.0000
Life years (undiscounted)	19.96	20.25	0.29
QALYs (undiscounted)	16.47	16.83	0.36

 Reduce one case of CVD for every 13 individuals treated

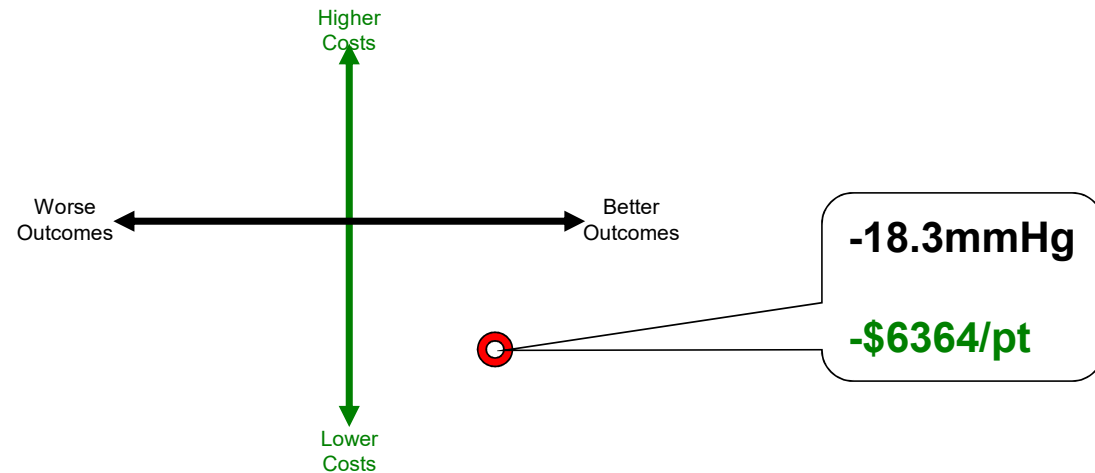
Lifetime cost outcomes per individual

- Accounting for all direct medical costs of the program plus downstream medical costs, pharmacist interventions associated with cost-savings
- Greater cost savings associated with full pharmacist prescribing

	Usual care	Pharmacist prescribing		Pharmacist intervention	
		Intervention	Difference	Intervention	Difference
Lifetime costs (undiscounted)	261,444	252,582	-8,862	265,044	-3,600
Lifetime costs (discounted 5%)	140,641	134,277	-6,364	142,372	-1,730

Economic Evaluation of Pharmacist-Managed Hypertension

Results:



- Economically dominant: Better BP outcomes and \$6,364 cost savings over a lifetime (discounted at 5%/y)
- If applied to 1/2 of Canadian population with uncontrolled hypertension:
 - 540,000 fewer cardiovascular events
 - 983,000 life-years gained
 - cost savings of \$CDN **15.7B**/30y

Marra C, Johnston K, Santschi V, Tsuyuki RT. *Can Pharm J* 2017;150:184-197.



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Blood pressure benefit of the intervention



Partial intervention

Full intervention

Manually define

Relative risk of diseases



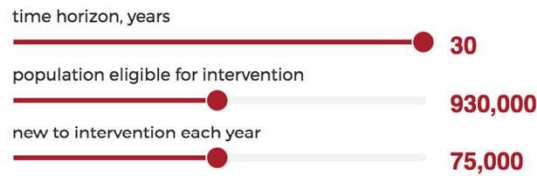
Key costs of pharmacist intervention



Epidemiology



Effects over time



Health and economic outcomes of pharmacist intervention (Canada)



21 %
544,729

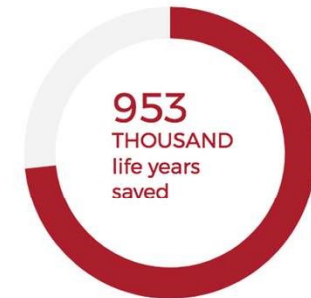
risk reduction for cardiovascular diseases
avoided cardiovascular events:

Stroke		133,647
Myocardial infarction		264,610
Angina		76,427
Heart failure		70,045
Kidney failure		1,806



more >

Impact
for eligible
population



<https://models.broadstreetheor.com/CPhA/Scenarios/index.html>



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Other health care systems

Australia

- Pharmacist prescribing
 - Dominant (savings of \$5000 per patient)
 - **2,000 additional life years saved**
 - **27.7 billion in cost savings**
- Pharmacist intervention
 - \$19,250 per QALY

Japan

- Pharmacist prescribing
 - Dominant
 - 0.3 additional life years, 0.4 additional quality-adjusted life years, and ¥712,394 cost savings over a lifetime.
 - At a population level, 10.5 million life years saved, and a cost savings of ¥21.3 trillion (about \$US 200 billion).



Other countries

- New Zealand
- Switzerland
 - Should this be done?



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Other questions

- The R_xEACH study demonstrated that pharmacist case finding, prescribing and care reduced the risk for cardiovascular (CV) events by 21%, compared to usual care
- If delivered to just 15% of the eligible population (at high risk for CV events), pharmacist interventions will save the Canadian healthcare system \$4.6 billion over 30 years
 - 592,049 QALYs will be gained
 - More than 9 million CV events would be avoided
- [J Am Coll Cardiol](#). 2016 Jun 21;67(24):2846-54. doi: 10.1016/j.jacc.2016.03.528. Epub 2016 Apr 4.



Interpretation

- Robust evidence that a pharmacist intervention in hypertension management can improve health outcomes and save money for third-party health payers
- More comprehensive interventions including prescription are associated with greater benefits (clinical and cost-savings)
- Pharmacists already have the required skills and knowledge for such a program; better utilizing pharmacist expertise could lead to improved population health and reduced health care spending, with negligible up-front investment



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Thank you

- Questions



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Status quo

- Assumes propagation of baseline
- RCTs show improvement in the control
 - RCT control populations are carefully selected
 - They are really not “intervention-less”
- Tested rigorously in sensitivity analysis.



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Pharmacist prescribing

- Enhanced pharmacist care
 - Assessment of and counseling about cardiovascular risk and BP control
 - Review of antihypertensive medications
 - Prescribing/titrating of drug therapy if deemed necessary
 - Wallet card for recording BP measurements, lifestyle advice, and written information on hypertension.
 - Followed up at monthly intervals until their BP was at target for 2 consecutive visits and thereafter at 3-month intervals for the duration of the study period
- Primary care physician was notified of all assessment results and drug therapy changes in person or by fax.



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Pharmacist intervention (Santschi et al. meta-analysis of 39 studies)

- Pharmacist-led in 23 studies
 - Collaborative care approach in 16 studies
 - Pharmacist/physician (N=10)
 - Pharmacist/nurse/physician (N=3)
 - Pharmacist/nurse/physician/dietitian or nutritionist therapist (N=2)
 - Pharmacist/nurse (N=1)
- Frequency of intervention
 - 17 studies: monthly or more frequent
 - 11 studies: less frequently than once a month



Pharmacist intervention (Santschi et al. meta-analysis of 39 studies)

- Interventions included
 - Patient education and counseling about lifestyle, medication and medication adherence (N=35)
 - Feedback to healthcare professional (including drug-related problems identification; medication change recommendation; team meeting, development of treatment plan) (N=35)
 - Medication management (including drug monitoring with adjustment or change in medication) (N=34);
 - Measurement of BP, hypertension staging and risk stratification, and reviewing of home BP measurements (N=13);
 - Reminder system (including telephone contact, web services, home visits, or drug adherence aid) (N=12); and
 - Healthcare professional education (including training program) (N=2).



Baseline characteristics

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Age (years)	63.5
Sex (% male)	48.8
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- Based on Tsuyuki et al. trial population

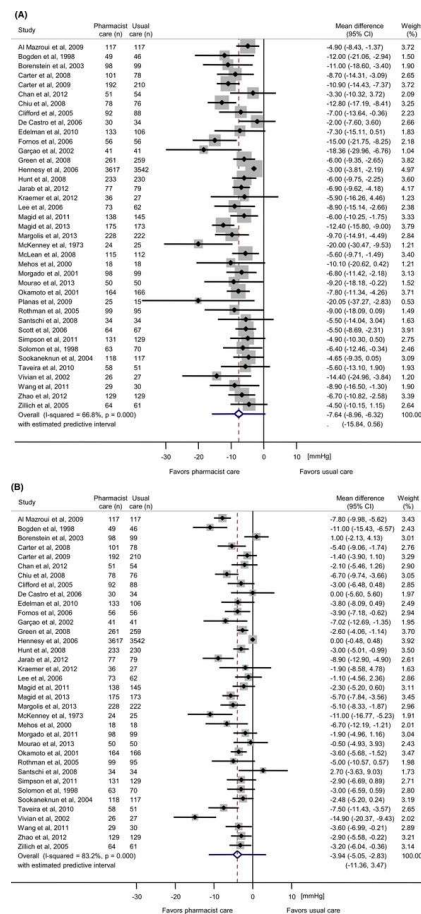


30-year cardiovascular risk score: 21.1%



ESRD incidence rate: 19.5 per 100,000 person-years

Forest plot of the mean difference in (A) systolic and (B) diastolic blood pressure with pharmacist care compared with usual care group. n=number of participants.



Valérie Santschi et al. J Am Heart Assoc 2014;3:e000718



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