



The Economic Value of Pharmacist-Physician Collaborative Care Models in Hypertension Management

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Center for Pharmacy Practice Innovation (CPPI) Seminar

The Economic Value of Pharmacist-Physician Collaborative Care Models in Hypertension Management - 2/28/2022

Speaker(s): Jessica Jay, PharmD, RPH

Topic: The Economic Value of Pharmacist-Physician Collaborative Care Models in Hypertension Management

CPPI invites various health care professionals from around the country and globe to speak on issues relating to innovation in the health care space.

Please contact the Center for Pharmacy Practice Innovation to request a meeting password by clicking [here](#).

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Meeting ID: 972 0552 6057

Objective(s):

1. Review changes in health care delivery that likely impact pharmacy practice.
2. Describe current trends in contemporary pharmacy practice as they relate to interprofessional collaboration.
3. Discuss practice innovations designed to improve health outcomes.
4. Discuss role delineation for pharmacists on the interprofessional health care team.

Location: Zoom

Specialties: Cardiovascular Disease, Endocrinology, Diabetes and Metabolism, Family Practice, General Practice, Nutrition, Pharmacist, Public Health, Academic/Research, Dietitians, Pharmacy Technician, Cardiology

Faculty Disclosures:

Jessica Jay, PharmD, RPH (Nothing to disclose - 02/07/2022)

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Purpose or Objectives: At the conclusion of this activity, the participant will be able to:

1. Review changes in health care delivery that likely impact pharmacy practice.
2. Describe current trends in contemporary pharmacy practice as they relate to interprofessional collaboration.
3. Discuss practice innovations designed to improve health outcomes.
4. Discuss role delineation for pharmacists on the interprofessional health care team.

Date/Time: 2/28/2022 12:00:00 PM

Accreditation:



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We acknowledge that no commercial or in-kind support was provided for this activity.

Disclosure of Financial Relationships:

The following planners, moderators or speakers have the following financial relationship(s) with commercial interests to disclose:

Name of individual	Individual's role in activity	Name of commercial interest/Nature of relationship
Dave Dixon, PharmD, FACC, FCCP, FNLA, BCACP, BCPS, CDE, CLS	Activity Director	Contracted Research-Boehringer Ingelheim Vetmedica GmbH - 08/04/2021
Jessica Jay, PharmD, RPH	Faculty	Nothing to disclose - 02/07/2022
Dana Burns, DNP	Planning Committee	Nothing to disclose - 12/16/2021
Teresa M Salgado, MPharm, PhD	Planning Committee	Nothing to disclose - 10/25/2021
Evan Sisson, Pharm.D., MSHA, BCACP, CDE, FAADE	Planning Committee	Nothing to disclose - 11/18/2021

Outline



- Background



- Study Aims



- Methods



- Results



- Discussion



- Limitations



- Future Research



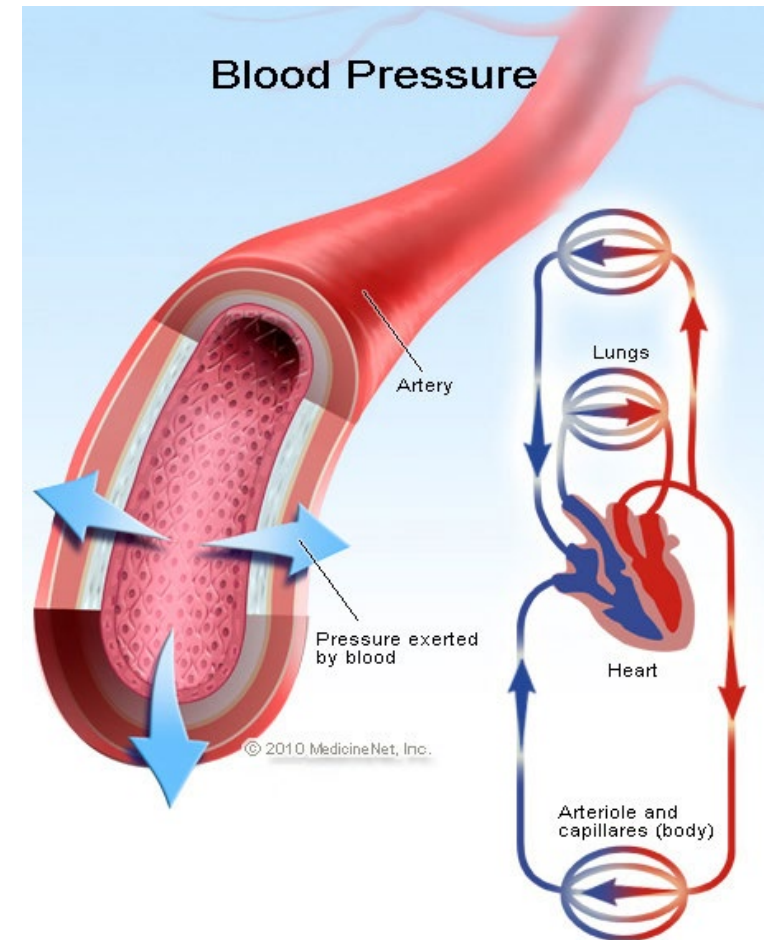
Hypertension¹

Blood pressure is the force exerted by circulating blood against the walls of the body's arteries. Hypertension is when blood pressure is too high.

About 46% of adults with hypertension are unaware that they have the condition.

Approximately 1 in 5 adults have their hypertension under control.

Hypertension is a major cause of premature death around the world.



Blood Pressure Categories

BLOOD PRESSURE CATEGORY	Heart Contracts		Heart Rests	
	SYSTOLIC mm Hg (upper number)		DIASTOLIC mm Hg (lower number)	
NORMAL	LESS THAN 120	and	LESS THAN 80	
ELEVATED	120-129	and	LESS THAN 80	
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130-139	or	80-89	
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	140 OR HIGHER	or	90 OR HIGHER	
HYPERTENSIVE CRISIS (consult your doctor immediately)	HIGHER THAN 180	and/or	HIGHER THAN 120	



Risk Factors of Hypertension¹

Modifiable Risk Factors



Non-Modifiable Risk Factors



Common Symptoms of Hypertension¹

“Silent Killer”

Symptoms

- Early morning headaches
- Nosebleeds
- Irregular heart rhythms
- Vision changes
- Buzzing in the ears



Complications of Hypertension¹

Angina

Myocardial Infarction

- Blood supply to the heart is blocked and heart muscle cells die from lack of oxygen

Heart Failure

- Heart cannot pump enough blood and oxygen to vital body organs

Irregular heartbeat that can lead to sudden death

Stroke

- Hypertension can burst or block arteries that supply blood and oxygen to the brain



Pharmacist-Physician Collaborative Care Model (PPCCM) vs. Usual Care²

PPCCM

- Pharmacists provide about 70% of the care that includes comprehensive medication management
- Pharmacists have a collaborative practice agreement with the medical director permitting initiation, titration, and discontinuation of medications and ordering and interpretation of laboratory tests for managing common primary care conditions

Usual Care

- Physicians, nurse practitioners, and physician assistants focus on the diagnosis of undifferentiated complaints and urgent care visits



Time In Target Range for Systolic Blood Pressure (TTR for Systolic BP)³

- Novel measure of arterial hypertension management

“Time in Target Range”

- Incorporates both the average BP value prevailing during long- term follow-up and the degree of BP variability

Four Ranges




- 0 – 25%
- 26 – 50%
- 51 – 75%
- 76 – 100%



Current Literature Landscape

Study 1
Dixon et al.

Impact of a pharmacist-physician collaborative care model on time-in-therapeutic blood pressure range in patients with hypertension

Dave L. Dixon Pharm.D., FCCP^{1,2}  | Eric D. Parod Pharm.D.³  |
Evan M. Sisson Pharm.D., MSHA^{1,2}  | Benjamin W. Van Tassell Pharm.D., FCCP¹ |
Pramit A. Nadpara Ph.D.¹ | Alan Dow M.D., MSHA⁴

Study 2
Fatani et al.

Systolic Blood Pressure Time in Target Range and Cardiovascular Outcomes in Patients With Hypertension



Nayyra Fatani, PHARM D,^{a,b,c} Dave L. Dixon, PHARM D,^d Benjamin W. Van Tassell, PHARM D,^d John Fanikos, RPH, MBA,^c Leo F. Buckley, PHARM D^c



Study 1 – Dixon et al.

Impact of a pharmacist-physician collaborative care model on time-in-therapeutic blood pressure range in patients with hypertension ⁴	
Objective	Determine the effect of a PPCCM on TTR for Systolic BP compared with a usual care group
Methods	<ul style="list-style-type: none">• Post-hoc analysis• Compared data obtained from two retrospective groups of patients with uncontrolled hypertension managed by either a PPCCM or Usual Care• 12-month follow-up period
Results	<ul style="list-style-type: none">• Mean TTR for Systolic BP was 46.2% ± 24.3% in the PPCCM group and 24.8% ± 27.4% in the Usual Care group (P < 0.0001)• Greater reductions in BP were observed in the PPCCM group compared with Usual Care (systolic BP: -27.8 vs -11.4 mmHg, respectively; P < 0.0001; diastolic BP: -19.2 vs -4.2 mmHg, respectively; P < 0.0001)• BP control rates at 12 months were 89% in the PPCCM compared with 50% in the usual care group (P < 0.0001)
Conclusion	Patients within PPCCM group had higher TTR for Systolic BP compared to those within the Usual Care group



Study 2 - Fatani et al.

Systolic Blood Pressure Time in Target Range and Cardiovascular Outcomes in Patients With Hypertension⁵

Objective	Estimate the independent association between time in systolic blood pressure target range and major adverse CVD events among adults with hypertension
Methods	Post-hoc analysis of SPRINT trial that compared intensive (<120 mmHg) and standard (<140 mmHg) systolic blood pressure treatment interventions in adults with hypertension and high CVD risk
Results	<ul style="list-style-type: none">• Participants with time in target range of 75% to <100% had lower 10-year CVD risk• Each 1-SD increase in time in target range was significantly associated with a decreased risk of first major adverse CVD event in fully adjusted models (HR: 0.78; 95% CI: 0.70 to 0.87; p < 0.001)• Time in target range remained significantly associated with major adverse CVD events despite adjustment for mean systolic blood pressure or systolic blood pressure variability
Conclusion	Time in systolic blood pressure target range independently predicts major adverse CVD event risk



Question #1

What are pharmacists in the pharmacist-physician collaborative care model implemented by Dixon et al. allowed to do to under their collaborative practice agreement for the management of hypertension?

- a. Order laboratory tests
- b. Initiate medications
- c. Discontinue medications
- d. All of the above



**Can we model the
impact of PPCCM on
costs/CV outcomes?**



Study Aims

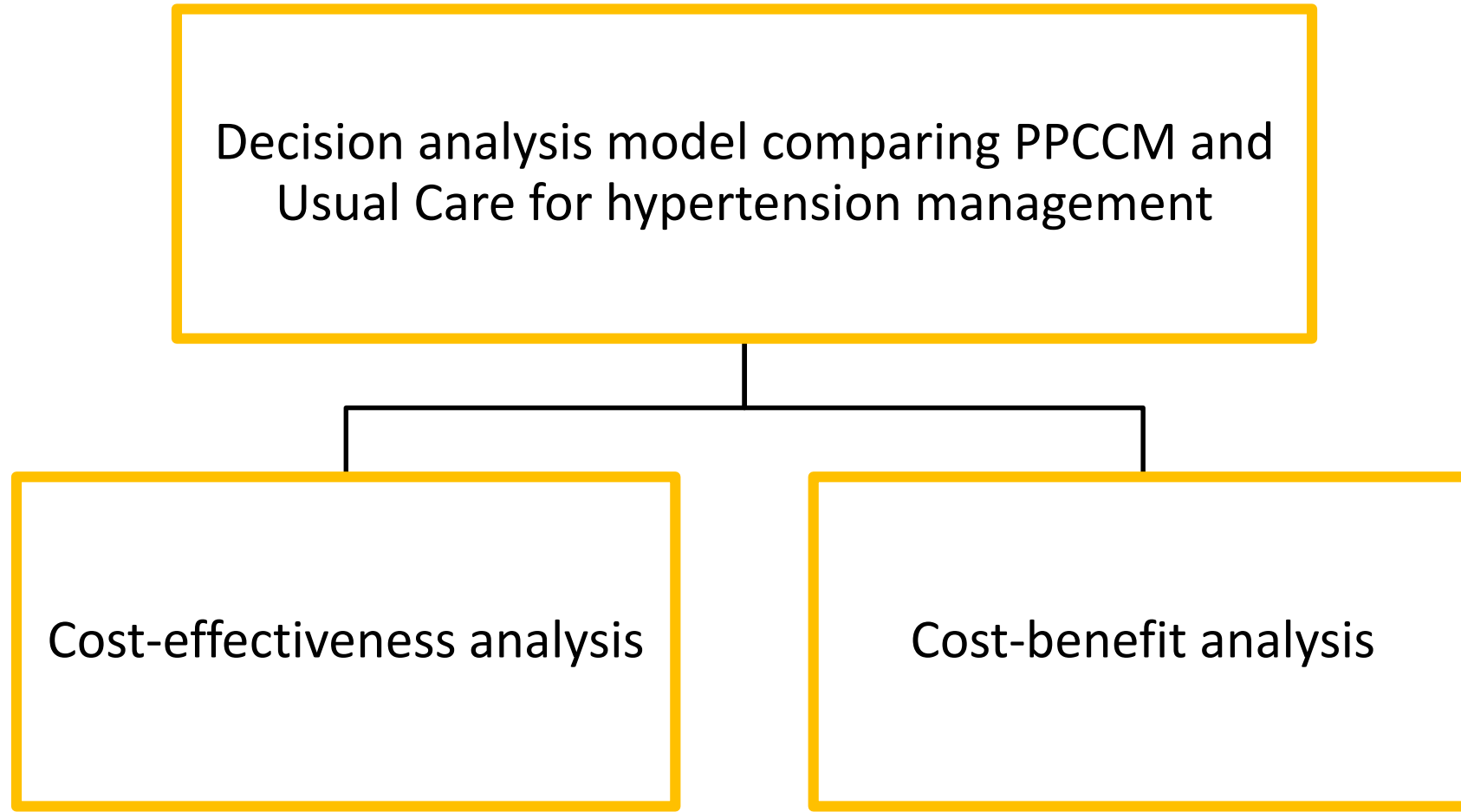
Compare the cost-effectiveness of PPCCM with Usual Care hypertension management for the prevention of nonfatal myocardial infarction (MI), stroke, heart failure (HF), and cardiovascular disease (CVD) death

Payer Perspective

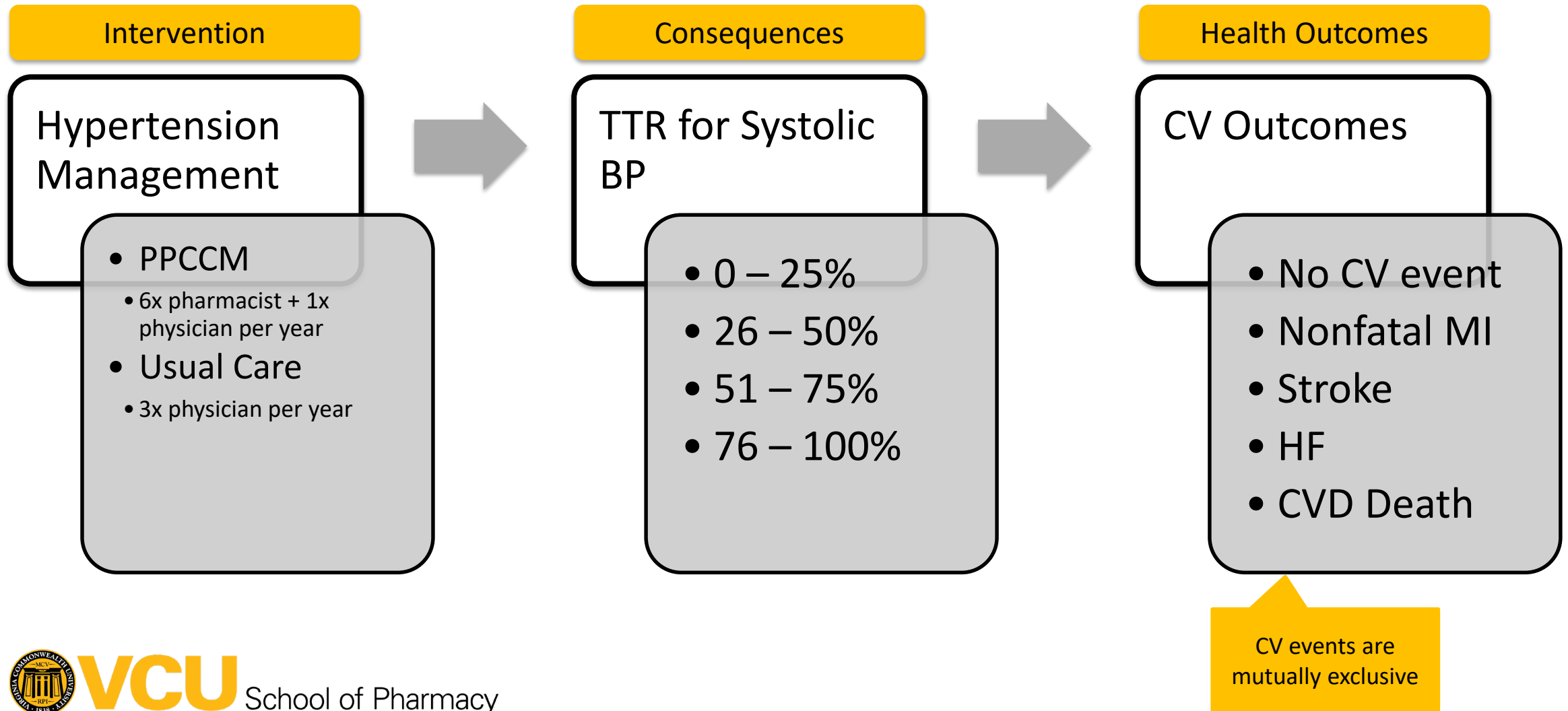
Quantify value added to a payer of covering PPCCM services



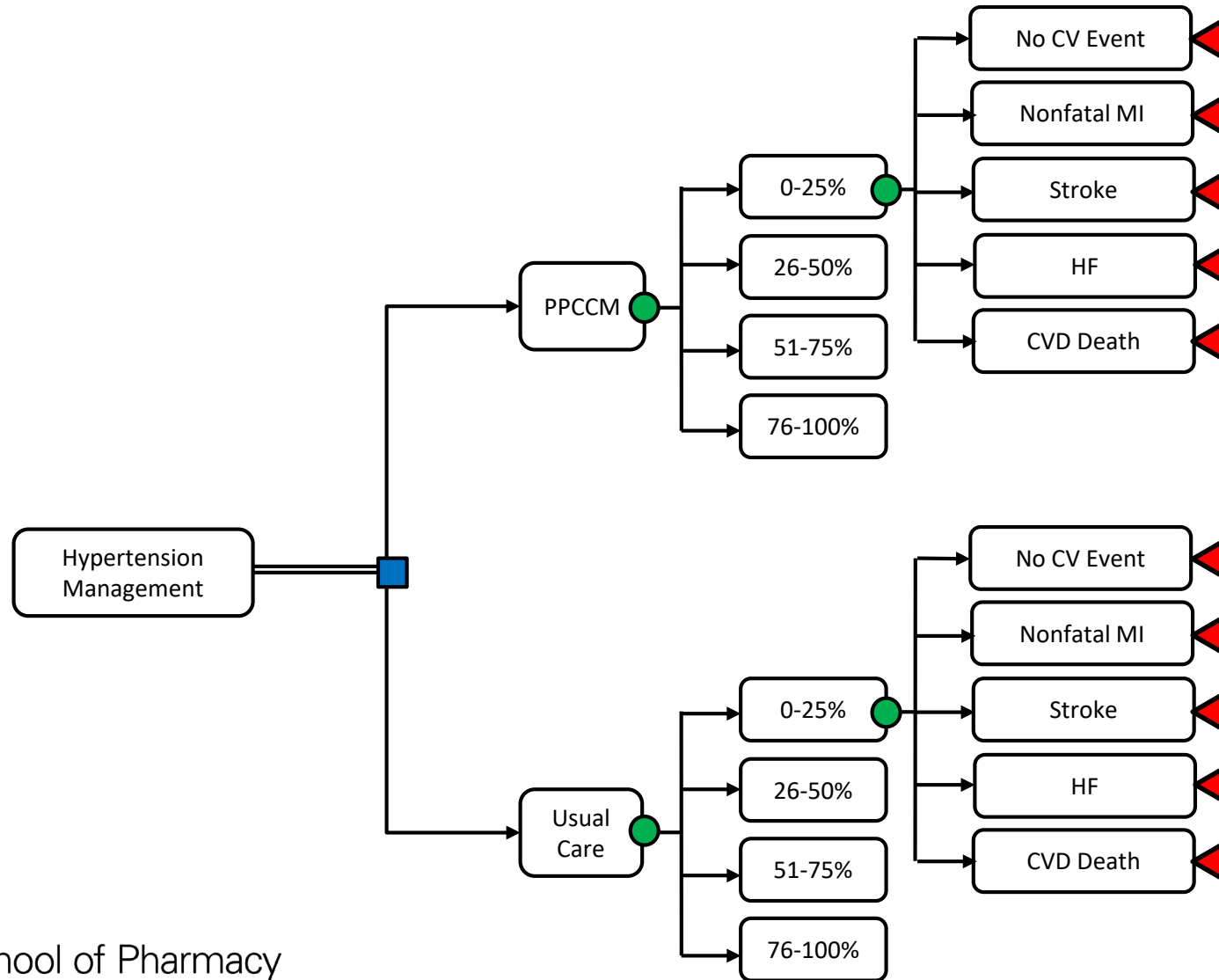
Methods: Study Design



Methods: Cost and Benefit Data



Methods: Decision Tree



Methods: Clinical Inputs

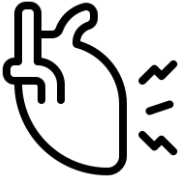

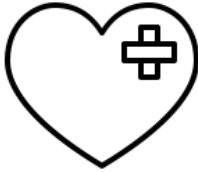

Probability of TTR for Systolic BP by Hypertension Management Approach⁴

	PPCCM	Usual Care
0-25%	0.210 (0.170-0.260)	0.550 (0.400-0.600)
26-50%	0.360 (0.290-0.430)	0.340 (0.270-0.400)
51-75%	0.310 (0.240-0.370)	0.050 (0.042-0.064)
76-100%	0.120 (0.098-0.150)	0.060 (0.044-0.066)



Methods: Clinical Inputs

Probability of CV Events by TTR for Systolic BP

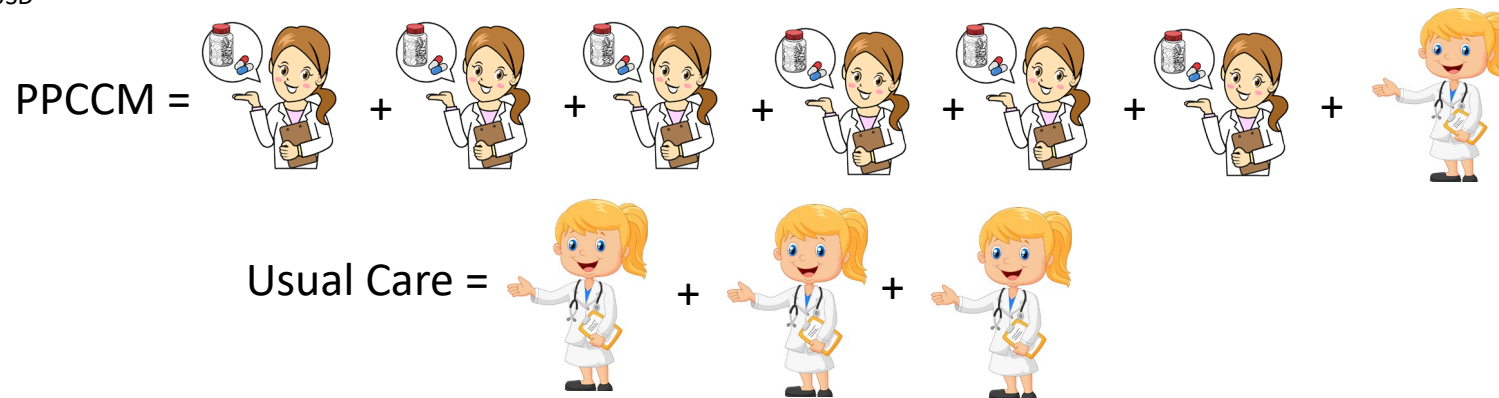
	No Event	 Myocardial Infarction	 Stroke	 Heart Failure	 CVD Death
Outcome Event Rates⁶					
0-25%	0.906 (---)	0.035 (0.027-0.045)	0.020 (0.014-0.028)	0.022 (0.016-0.031)	0.017 (0.012-0.024)
Hazard Ratios⁵					
26-50%	1.03 (---)	0.83 (0.57-1.18)	0.83 (0.55-1.27)	1.30 (0.94-2.01)	0.69 (0.42-1.15)
51-75%	1.12 (---)	0.87 (0.61-1.24)	0.58 (0.36-0.93)	0.84 (0.54-1.29)	0.53 (0.30-0.92)
76-100%	1.25 (---)	0.69 (0.46-1.04)	0.40 (0.22-0.73)	0.59 (0.34-1.02)	0.45 (0.23-0.86)



Methods: Cost Inputs

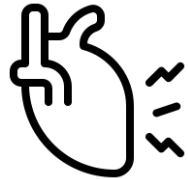

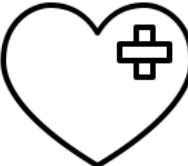
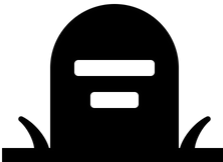
Programmatic Costs			
Variables	Base-case costs	Range	References
Annual PPCCM Pharmacist Visits, No.	6	4-12	Dixon et al, 2020 ⁴
PPCCM cost per visit	\$24	\$19-\$29	American Society of Health-System Pharmacists (ASHP) ⁷
Annual Physician Visits, No.			
PPCCM	1	1-2	Assumption
Usual Care	3	1-6	Dixon et al, 2020 ⁴
Physician cost per visit	\$90	\$72-\$108	Center for Medicare and Medicaid Services (CMS) ⁸
Total cost of PPCCM	\$702	\$562-\$842	American Society of Health-System Pharmacists (ASHP)
Total cost of Usual Care	\$810	\$648-\$972	Center for Medicare and Medicaid Services (CMS) ⁸

*All costs were inflated to 2020 USD



Methods: Cost Inputs

Downstream Healthcare Costs⁹

	Base-case costs	Range
One-time cost of myocardial infarction 	\$24,089	\$15,372-\$32,306
One-time cost of stroke 	\$15,678	\$6,001-\$42,039
One-time cost of heart failure 	\$11,678	\$11,669-\$16,580
One-time cost of CVD death 	\$19,514	\$12,560-\$33,024



Methods: One-Way Sensitivity Analysis

TTR for Systolic BP

- Base Case: Published data
- Sensitivity Analyses: $\pm 20\%$

CV Outcomes

- Base Case: Published data
- Sensitivity Analyses: Published data
- No CV Event was based on assumption

Costs of PPCCM and
Usual Care Visits

- Base Case: Published data from ASHP and CMS
- Sensitivity Analyses: $\pm 20\%$
- Costs adjusted for inflation

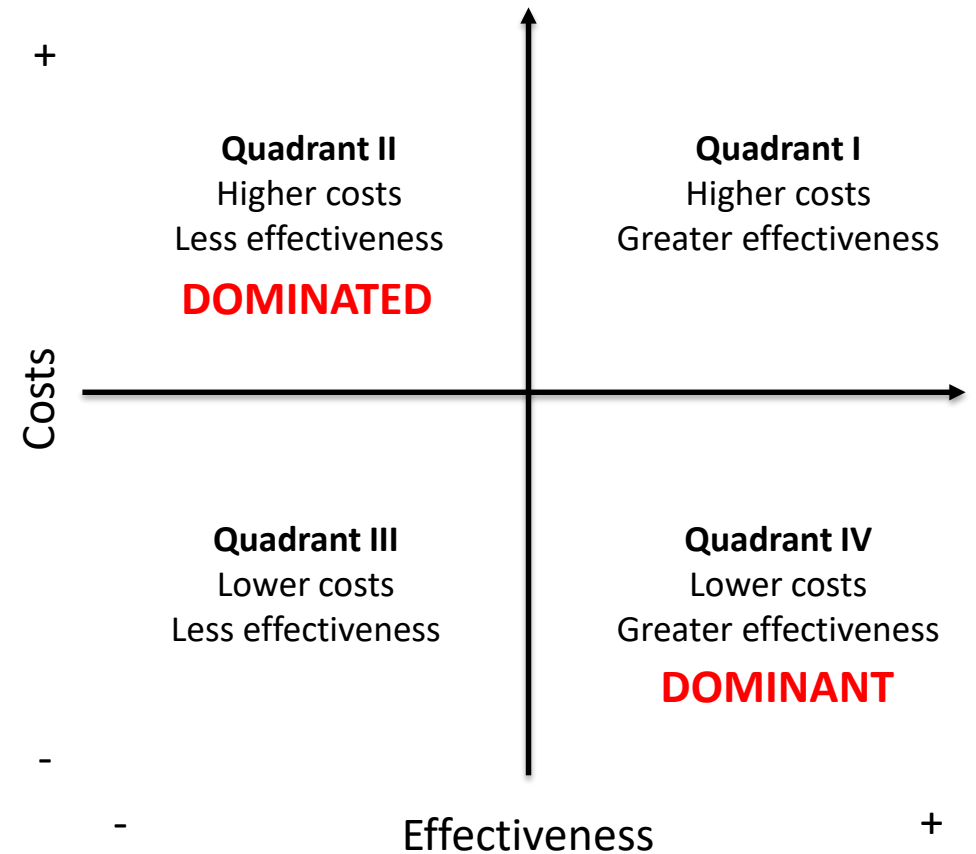
One-time Costs of
CV Events

- Base Case: Published data
- Sensitivity Analyses: Published data
- Costs adjusted for inflation



Results: Cost-Effectiveness and Cost-Benefit

Cost-Effectiveness			
	PPCCM	Usual Care	Difference
Cardiovascular Events			
Nonfatal MI	0.0300	0.0321	21 per 10,000
Stroke	0.0149	0.0178	29 per 10,000
Heart Failure	0.0225	0.0237	12 per 10,000
CVD death	0.0116	0.0143	27 per 10,000
Cost-Benefit			
Total downstream healthcare expenditures	\$1,535.82	\$1,698.64	- \$162.82
Total program costs	\$702.00	\$810.00	- \$108.00
Cost-benefit ratio	Dominant		



PPCCM was LESS COSTLY to administer and resulted in downstream healthcare savings relative to usual care



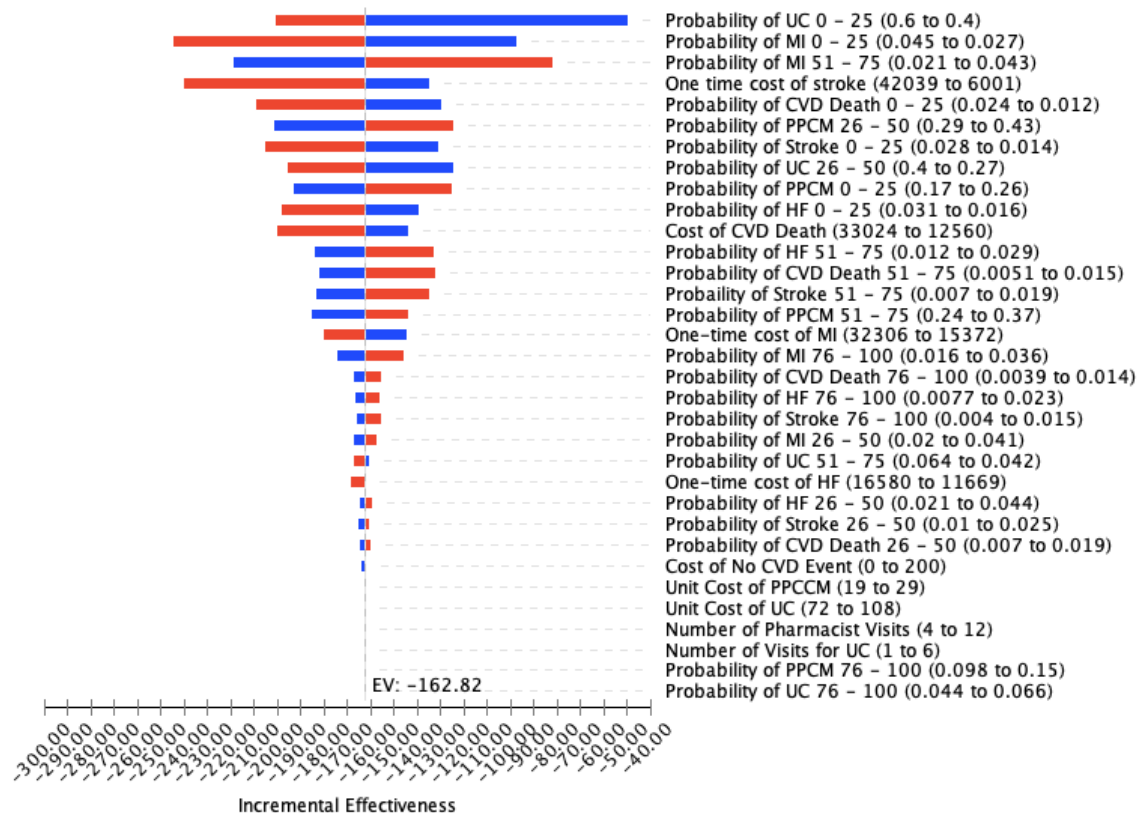
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Results: Sensitivity Analysis

Tornado Diagram – Incremental Effectiveness
Pharmacist-Physician Collaborative Care Model (PPCCM)

vs.
Usual Care



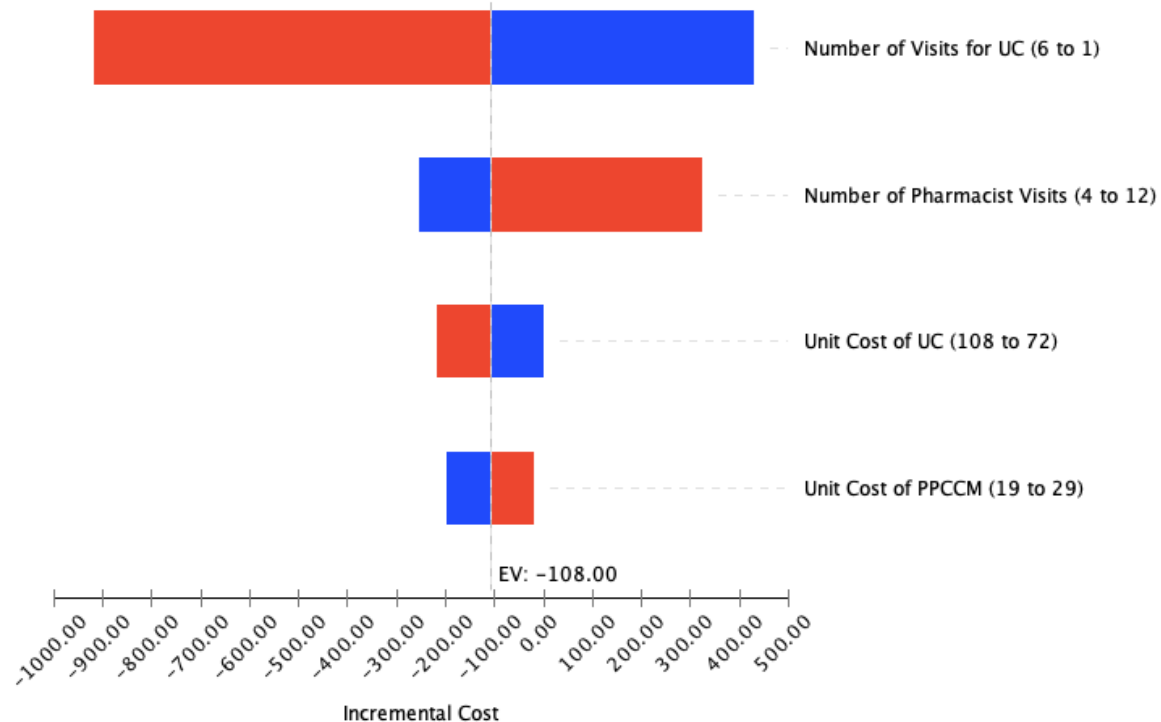
Of all the variables included in the cost-benefit analysis, it is most sensitive to...

- Probability of Usual Care in TTR for Systolic BP 0-25%
- Probability of MI in TTR for Systolic BP 0-25%
- Probability of MI in TTR for Systolic BP 51-75%
- One time cost of stroke



Results: Sensitivity Analysis

Tornado Diagram – Incremental Cost
Pharmacist–Physician Collaborative Care Model (PPCCM)
vs.
Usual Care

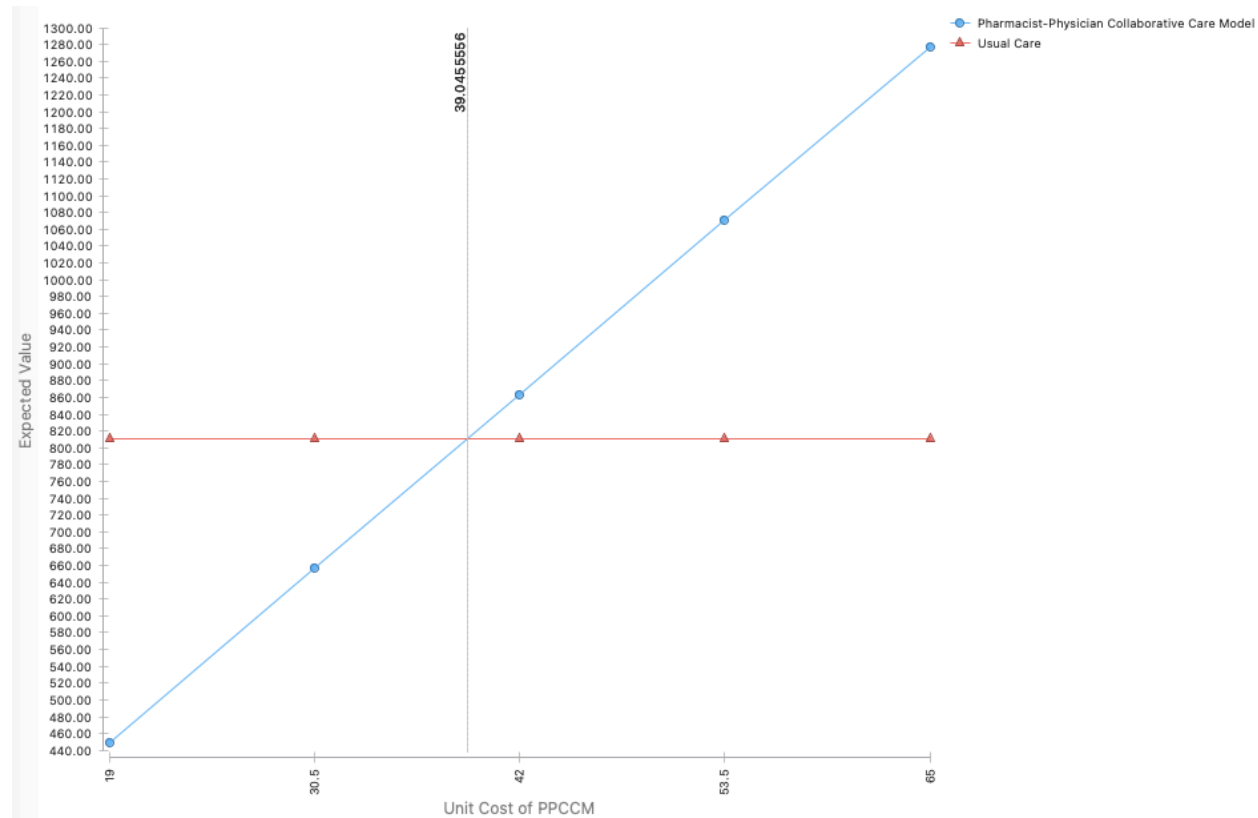


The program costs of hypertension management with PPCCM, while lower than those of usual care in base case analyses, were sensitive to the number of visits with a physician (usual care patients) and pharmacist (PPCCM patients).



Results: Threshold Analysis

Threshold Analysis (Unit Cost of PPCCM Visit): PPCCM vs. Usual Care for Hypertension Management

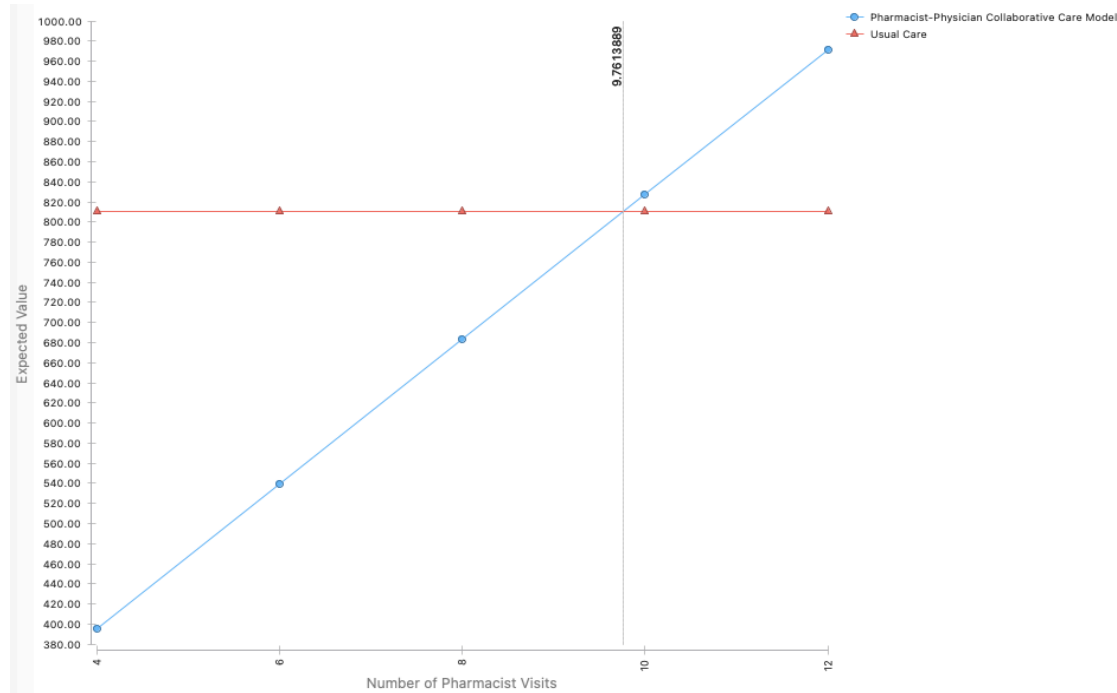


The costs of the PPCCM and usual care programs became equal when the unit cost of pharmacist visits increases 62.5% to \$39.



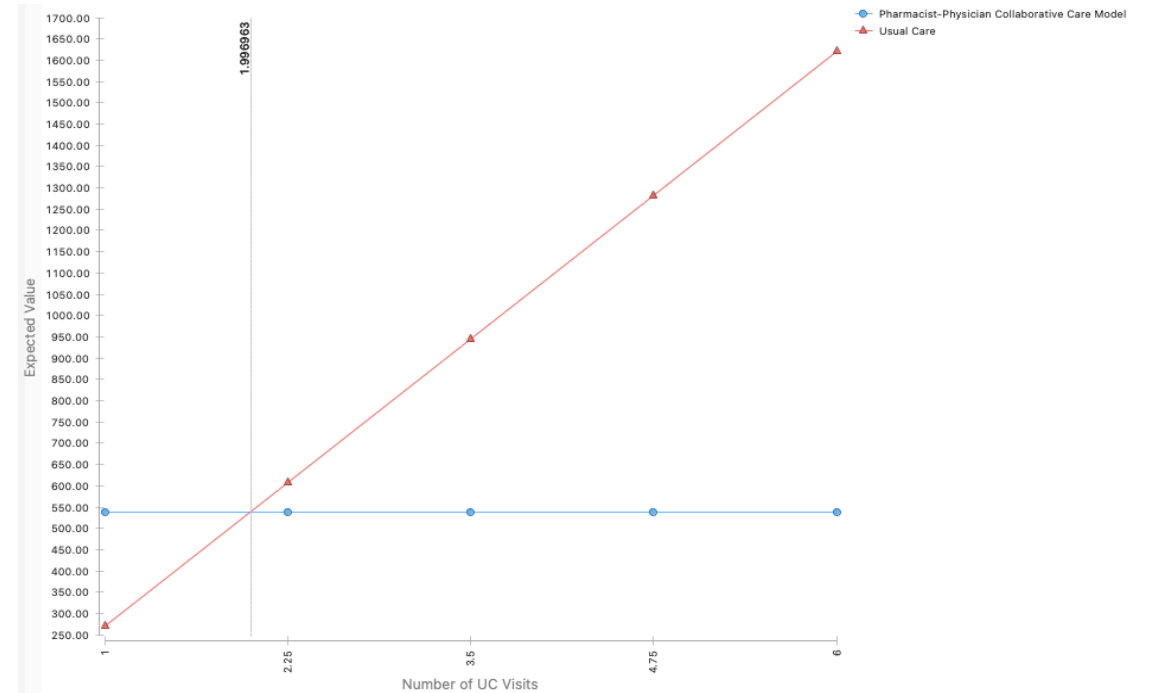
Results: Threshold Analysis

Threshold Analysis (Number of PPCCM Visits): PPCCM vs. Usual Care for Hypertension Management



If the patient sees the pharmacist 10 times or more per year then it is no longer cost savings.

Threshold Analysis (Number of Usual Care Visits): PPCCM vs. Usual Care for Hypertension Management



Usual Care is cheaper if the patient visits the physician less than twice per year.



Question #2

If payers reimbursed PPCCM only for the patients most likely to show cost savings, which patient would we expect to be eligible for the service?

- a. Patient with pre-hypertension
- b. Patient with controlled hypertension who had one hypertension-related physician visit last year
- c. Patient with uncontrolled hypertension who had one hypertension-related physician visit last year
- d. Patient with uncontrolled hypertension who had four hypertension-related physician visits last year



Discussion

PPCCM had twice as many clinic visits, but given current pharmacist reimbursement rates, still incurred fewer program costs

PPCCM is associated with lower downstream healthcare expenditures

Payer coverage of PPCCM services can provide a positive return on investment



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Comparing These Results with Past Cost-Benefit Analysis on PPCCM

Polgreen et al.¹⁰

- Cost-effectiveness analysis from a societal perspective
- Determined costs based on time spent with pharmacists and providers and their average compensation rates
- Reported provider costs over a 9-month period were \$238.96 for PPCCM patients and \$113.67 for usual care patients managed only by a physician

Kulchaitanaroaj et al.¹¹

- Cost-utility analysis from a payer perspective
- Determined costs based on time primary care physicians and pharmacists spent providing direct patient care and collaborating, specialist time for direct patient care during acute care visits, laboratory tests, antihypertensive medications, and overheads
- Reported provider costs over a 9-month period were \$345.25 for PPCCM patients and \$111.84 for usual care patients managed only by a physician



Question #3

How did our costing of pharmacist time differ from published studies?

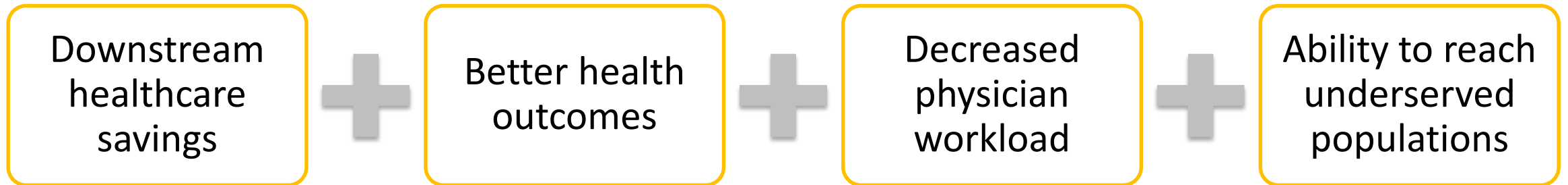
- a. Our costing was based on expert opinion of the value of pharmacist time
- b. Our costing was based on the average pharmacist wage
- c. Our costing utilized CPT “incident-to” billing code
- d. Our costing was the same as published studies



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Value Proposition for PPCCM



Next Steps for a Payer

Reimburse pharmacist services

- CPT “incident-to” billing

Who would skeptical payers cover PPCCM services for?

- Cost of PPCCM hypertension management exceeded the cost of usual care among patients with only one hypertension-related physician visit each year
- Payers concerned with the immediate budget impact of PPCCM reimbursement may focus on coverage for patients with at least two or three hypertension-related physician visits annually



Question #4

Which of the following was true about the costs of PPCCM?

- a. PPCCM had lower program costs because pharmacists met with patients fewer times/year than usual care providers
- b. PPCCM had lower program costs because pharmacists are reimbursed at a lower rate than usual care providers through “incident to” billing
- c. PPCCM had higher program costs than usual care because pharmacists met with patients more times/year than usual care providers
- d. PPCCM had higher program costs because pharmacists time was valued at a higher rate than physician time



Limitations

Differences in study demographics

- TTR for systolic BP data was collected from a study with a small population of 112 patients
- CV outcomes collected from the SPRINT trial had a large population with more diverse backgrounds

Did not have incorporate the cost of medications due to lack of information

Hypertension is a chronic disease that is often linked to multiple CVD events, but we only included the first occurrence of a CVD event

- May have underestimated the impact of PPCCM on long-term adverse CV events associated with TTR for systolic BP



Future Research



Quantify costs associated with medications to identify their impact from the payer perspective

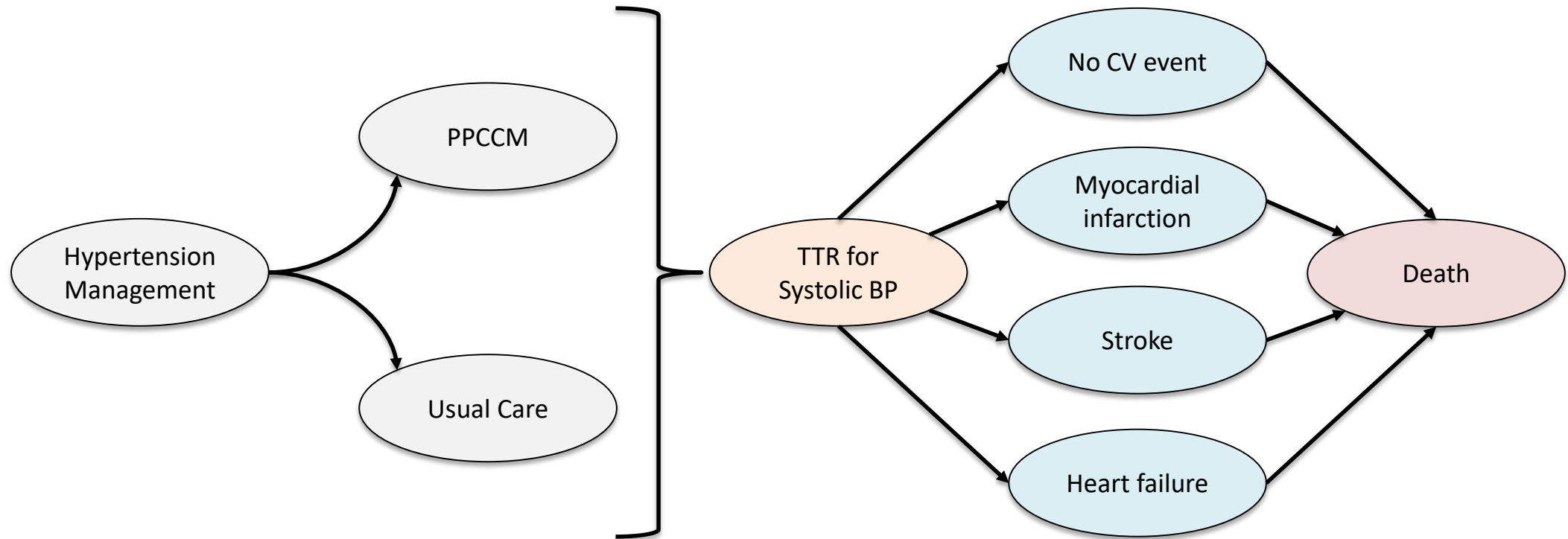
Markov Model investigating recurrent CV events over a lifetime



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Markov Model Idea



Conclusion

- First study to evaluate the cost-effectiveness of PPCCM compared to usual care on TTR for systolic BP in adults with hypertension
- PPCCM was less costly to administer and resulted in downstream healthcare savings and fewer acute CV events relative to usual care
- Pharmacists are in a unique position to bridge the gap between the health professional shortage in rural areas and physician workload



