

Heart Disease and Stroke Prevention: Tailored Pharmacy-based Interventions to Improve Medication Adherence, Updated 2026

Community Preventive Services Task Force Finding and Rationale Statement Ratified April 2019

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CPSTF Finding and Rationale Statement

Intervention Definition

Tailored pharmacy-based interventions aim to help patients with cardiovascular disease risk conditions take their medications as prescribed. Community or health system pharmacies use assessment tools or interviews to identify adherence barriers for each patient. Pharmacists then provide tailored guidance and services to reduce those barriers.

Tailored guidance includes either focused medication counseling or motivational interview sessions. Services include one or more of the following: patient tools such as pillboxes, medication cards and calendars, medication refill synchronization, and enhanced follow-up.

Interventions may include additional components such as communication between the pharmacist and the patient's primary care provider, or patient education materials. Interventions may be used alone, or they may be part of a broader intervention to reduce patients' cardiovascular disease risk.

CPSTF Finding (April 2019)

The Community Preventive Services Task Force (CPSTF) recommends tailored pharmacy-based adherence interventions based on strong evidence of effectiveness in increasing patient adherence to medications for cardiovascular disease prevention. Studies of interventions delivered by pharmacists in community and health system pharmacies found meaningful increases in the proportion of patients who reported taking medications as prescribed.

The CPSTF finds the intervention is cost-effective for cardiovascular disease prevention based on a median estimate of \$11,298 per quality adjusted life year (QALY) saved, which is below a conservative threshold of \$50,000.

Rationale

Basis of Finding

The CPSTF finding is based on evidence from a systematic review of 48 studies (search period through August 2018). The Community Guide review focused on four primary outcomes: (1) medication adherence, (2) cardiovascular disease risk conditions including blood pressure and cholesterol, (3) health care utilization, and (4) cardiovascular disease morbidity and mortality.

Studies had to measure intervention effects on medication adherence to be included in the review. Included studies used a variety of measurements to evaluate adherence precluding an overall summary effect estimate.

In 27 studies, adherence measures were converted into dichotomous patient outcomes (i.e., adherent or non-adherent) based on whether patients possessed, took, or refilled their prescribed cardiovascular prevention medications at least 80% of the time. The proportion of patients considered adherent increased by a median of 6.9 percentage points [Interquartile interval (IQI): 3.4 to 14.0 percentage points]. Subsets of these 27 studies reported different adherence measures and used uncontrolled before-after designs. Results are presented in Table 1.

Table 1: Medication Adherence Outcomes

Outcome Measure		Results
Proportion of patients achieving high medication adherence (>80%)	Overall (27 studies)	Median increase of 6.9 percentage points (IQI: 3.4 to 14.0 percentage points)
	Subset: Proportion of days covered >80% (9 studies)*	Median increase of 4.9 percentage points (IQI: 3.4 to 14.9 percentage points)
	Subset: Medication possession ratio >80% (8 studies)*	Median increase of 3.7 percentage points (IQI: -0.4 to 7.1 percentage points)
	Subset: Other Measures >80% count or score (7 studies)*	Median increase of 11.6 percentage points (IQI: 7.1 to 15.1 percentage points)
	Subset: Uncontrolled Before-After studies (3 studies)	Median increase of 23.2 percentage points (Range: 3.4 to 69 percentage points)

Count or score: Includes pill count thresholds or maximum adherence scores using validated MMAS-8 and MMAS-4 self-report tools
 IQI = interquartile interval

*Greatest or moderate quality of design

The remaining 21 studies examined intervention effectiveness for medication adherence based on mean patient differences or changes in various adherence measurements or tools. In ten studies, patient adherence measures were determined through objective provider counts or records. In seven studies, adherence measures were determined from patient self-reported tools or counts. The final four studies used unique measures and were evaluated separately; two studies reported favorable improvements and two studies found no significant effect on medication adherence. Results are presented in Table 2.

Table 2: Additional Medication Adherence Outcomes

Outcome Measure	Results
Provider or pharmacy determined proportion of doses taken as prescribed* (11 studies)	Median increase of 5.4 percentage points (IQI: 4.0 to 11.4 percentage points)
Patient self-reported proportion of doses taken as prescribed** (6 studies)	Median increase of 17.1 percentage points (IQI: -2.8 to 19.7 percentage points)
Other measures on medication adherence (4 studies)	Two studies reported statistically significant increases in adherence Two studies reported no significant effect on adherence

*Four studies used mean proportion of days covered, four studies recorded each dose taken, one study used medication possession ratio, one study recorded pill counts, and one study recorded refill rates.

**Three studies used the patient-reported MMAS-4 adherence tool, two studies used MMAS-8 reports, and one study used patient self-reported pill counts.

IQI = interquartile interval

Subsets of the included studies evaluated intervention effects on blood pressure control (13 studies) and lipid control (4 studies). Most of these studies included a tailored adherence intervention as part of a broader cardiovascular disease prevention intervention. The proportion of patients who achieved blood pressure control increased by a median of 13.9 percentage points (IQI: 5.8 to 28.2 percentage points). Effects on LDL (3 studies) or total cholesterol (1 study) were mixed. Results are presented in Table 3.

Table 3: Cardiovascular Risk Outcomes

Outcome Measure	Results
Blood pressure at goal (13 studies)	Median increase of 13.9 percentage points (IQI: 5.8 to 28.2 percentage points)
Lipids at goal (4 studies)	Studies examined different lipid outcomes with mixed findings

IQI = interquartile interval

The review team assessed additional evidence for healthcare, morbidity, and mortality from studies that used different outcomes or inconsistent units of measure, or didn't report baseline information. Six studies (7 estimates) measured emergency room visits and showed mixed results (5 favorable, 1 no change, 1 unfavorable). Nine studies reported on hospitalizations (e.g., number of admissions, days in hospital) and showed mixed results (5 favorable, 3 no change, 1 unfavorable). Four studies (5 estimates) measured death and incidence of disease and were mostly favorable but not significant (4 favorable, 1 no change).

Most of the studies used a team-based care approach that provided patients with contact, communication, or feedback from a primary care provider (29 studies). The remaining studies either did not use team-based care or did not indicate if they used team-based care (19 studies).

Interventions delivered counseling face-to-face (18 studies), by telephone (8 studies), or both in person and by phone (17 studies). Patients participated in three to five sessions (19 studies), fewer than two sessions (13 studies), or six or more sessions (8 studies). Interventions were delivered by pharmacists (41 studies) or a combination of pharmacy residents and pharmacy technicians (7 studies). Study duration ranged from 6 months (18 studies), to 7-11 months (8 studies), to 12 months (22 studies).

Applicability and Generalizability Issues

The 48 included studies were conducted in the United States (23 studies), Europe (12 studies), Canada (5 studies), Hong Kong (4 studies), and Australia (4 studies).

Studies were implemented in community pharmacies (27 studies), health system pharmacies (14 studies), or a combination of both (5 studies). In two studies, health systems implemented an adherence telephone support service

for patients. While some studies specifically included rural (5 studies), or urban (12 studies) pharmacies, most of the studies did not report this information (28 studies). Included studies evaluated outcomes in fewer than 100 patients (10 studies), 100-500 patients (21 studies), or more than 500 patients (16 studies); one study did not report sample size.

Across all studies, the median age for patients was 61.6 years (IQR: 59.0 to 66.8; 43 studies); 52.1% were female (IQR: 39.3 to 61.3; 46 studies). The cardiovascular disease risks or conditions most commonly reported were hypertension (high blood pressure; 27 studies), hyperlipidemia or dyslipidemia (abnormal amounts of lipids in blood; 18 studies), diabetes combined with hyperlipidemia or dyslipidemia (10 studies), and cardiovascular disease (8 studies).

Ten studies from the United States also provided information about patients' demographic characteristics. Of the seven studies that provided information about race and ethnicity, six reported a median of 43% African-American patients (IQR: 34.6% to 60.3%) and one study reported a majority of patients were African-American. Five studies that provided information about patients' educational achievement reported a median of 38.7% of patients had less than a high school degree (IQR: 26% to 44.5%). Of the four studies that provided information about household income, three reported a median of 34.6% of patients (range: 19.0% to 51.0%) had household incomes less than \$25,000, and one study reported patients' average household income was \$30,000.

Data Quality Issues

Of the 48 included studies, 26 were randomized controlled trials, seven were other design with concurrent comparison, one was before and after with comparison, six used a retrospective cohort, and eight were before and after without a comparison. Trials randomized recruited pharmacies (17 studies) or patients within pharmacies (9 studies). Most studies assigned patient recruitment to study pharmacists, introducing potential for selection and recruitment biases. In general, studies provided little information about the demographic characteristics of recruited patients except for age, gender, and cardiovascular disease risks and conditions. Baseline information was not consistently reported in some studies.

Potential Benefits

None of the included studies reported or examined additional benefits of tailored interventions. The CPSTF postulates potential benefits could include improved pharmacist-patient communication, which could increase patient reporting of all medication issues, including side effects. Similarly, interventions involving communication between pharmacists and primary care providers could create opportunities for team-based patient care.

Potential Harms

None of the included studies reported or examined potential harms of tailored interventions. The CPSTF did not postulate any harms of these interventions.

Related Reviews and Recommendations

The CPSTF did not identify any systematic reviews of pharmacy-based adherence interventions based on individualized patient assessment and tailored counseling and support. Several published systematic reviews examined the effectiveness of related approaches such as pharmacist interventions for chronic disease management (Milosavljevic et al., 2018) and adherence interventions implemented in ambulatory settings, regardless of the implementer (Van Driel et al., 2018).

Economic Evidence

Economic evidence shows tailored pharmacy-based adherence interventions to prevent cardiovascular disease are cost-effective. For patients with existing cardiovascular disease, the evidence shows averted healthcare cost exceeds the cost of intervention for a favorable return on investment (ROI) from a healthcare system perspective.

The economic review included 38 studies (search period through May 2019). Twenty-nine studies evaluated interventions to prevent cardiovascular disease. Nine studies focused on patients with existing cardiovascular disease or cardiovascular disease management. All monetary values are reported in 2018 U.S. dollars.

Studies were based in the United States (27 studies), the Netherlands (3 studies), the United Kingdom (2 studies), Canada (2 studies), Hong Kong (2 studies), Taiwan (1 study), and Spain (1 study). Studies were set in pharmacies (21 studies), primary care clinics (13 studies), a mix of the two (1 study), or the facilities of pharmaceuticals benefits managers (3 studies). The majority of studies (21 studies) were implemented in urban areas.

The median sample sizes were 232 for cardiovascular disease prevention and 174 for cardiovascular disease management. There were more females in the studies for cardiovascular disease prevention compared to those for cardiovascular disease management (56% versus 42%) and the patients were younger (58 years versus 65 years). The cardiovascular disease prevention studies included patients with high blood pressure (10 studies), dyslipidemia (4 studies), type 2 diabetes (14 studies), and a combination of cardiovascular risk factors (8 studies). The cardiovascular disease management studies included patients with heart failure (3 studies), coronary heart disease (2 studies), and multiple cardiovascular conditions or type 2 diabetes (4 studies).

The economic review team assessed the quality of evidence by considering how well each estimate captured the components considered to be drivers of magnitude and the appropriateness of measurement and valuation; the lower of the two assessments was used to determine overall quality. The majority of intervention cost estimates were of good quality (17 estimates); the remaining were of fair quality (9 estimates). The most frequent limitation was failure to include cost of patient education materials or adherence aids.

The healthcare cost estimates were mixed in quality, with 14 good, 19 fair, and 5 of limited quality. The most frequently assessed limitations were failure to include inpatient or emergency department costs, inclusion of medication cost only, and cost assessments based on all causes of healthcare use rather than use related to cardiovascular disease and risk factors.

Intervention Cost

- The median cost per patient per year for interventions to prevent cardiovascular disease was \$246 (IQI: \$95 to \$499), based on 20 estimates from 19 studies.
- The median cost per patient per year for interventions to manage cardiovascular disease was \$292 (IQI: \$96 to \$422), based on 6 estimates from 6 studies.

Healthcare Cost

- The median change in healthcare cost per patient per year for interventions to prevent cardiovascular disease was -\$355 (IQI: -\$981 to -\$23), based on 25 estimates from 25 studies.
- The median change in healthcare cost per patient per year for interventions to manage cardiovascular disease was -\$1784 (IQI: -\$4683 to -\$258), based on 8 estimates from 8 studies.

Total Cost

Total cost is measured as the sum of the change in healthcare cost due to intervention and the cost of intervention. A negative value indicates averted healthcare cost exceeds intervention cost.

- The median total cost per patient per year for interventions to prevent cardiovascular disease was -\$49 (IQI: -\$636 to \$249), based on 22 estimates from 21 studies. The total cost estimates for cardiovascular disease prevention were inconsistent, with ten estimates reporting positive total cost and twelve estimates reporting negative total cost.
- The median total cost per patient per year for interventions to manage cardiovascular disease was -\$1080 (IQI: -\$2816 to -\$163), based on 7 estimates from 7 studies. For all but one of the estimates, the reduced healthcare cost exceeded the cost of intervention indicating net cost savings when implemented for patients with existing cardiovascular disease.

Cost-effectiveness

- The median cost per QALY saved for interventions to prevent cardiovascular disease was \$11,298 (IQI: \$5660 to \$28,416), based on 5 estimates from 5 studies. The median and third quartile were below a conservative \$50,000 threshold. Only one estimate was above the threshold and the study that reported this result computed cost per QALY based on health outcomes within a 9-month trial period.
- There were no studies that reported cost-effectiveness outcomes for interventions to manage cardiovascular disease.

The systematic economic review finds pharmacy-based adherence interventions to prevent cardiovascular disease are cost-effective based on a median estimate of \$11,298 per QALY saved, which is below a conservative \$50,000 threshold. For patients with existing cardiovascular disease, economic evidence indicates that the healthcare cost averted exceeds the cost of implementation for a favorable return on investment (ROI) from a healthcare systems perspective.

Considerations for Implementation

The Joint Commission of Pharmacy Practitioners developed the [Pharmacists' Patient Care Process](https://www.pharmacist.com/sites/default/files/files/PatientCareProcess.pdf) [https://www.pharmacist.com/sites/default/files/files/PatientCareProcess.pdf] in 2014 that outlines steps to optimize patient health and medication outcomes. The steps in this process (i.e., collect, assess, plan, implement, follow-up, and monitor) closely align with the process for selecting tailored actions to remove or reduce patient adherence barriers to medication adherence.

Pharmacies may want to implement tailored pharmacy-based interventions to increase medication adherence as part of a broader pharmacist-patient care process. CDC has a resource guide to help pharmacies implement this process:

- [Using the Pharmacists' Patient Care Process to Manage High Blood Pressure: A Resource Guide for Pharmacists](https://www.cdc.gov/dhds/pubs/docs/pharmacist-resource-guide.pdf) [https://www.cdc.gov/dhds/pubs/docs/pharmacist-resource-guide.pdf]

The Million Hearts Initiative® provides [action guides](https://millionhearts.hhs.gov/tools-protocols/medication-adherence.html) [https://millionhearts.hhs.gov/tools-protocols/medication-adherence.html] that detail organizational considerations and ways to increase medication adherence for cardiovascular disease prevention.

Several previous CPSTF recommendations relate to the current finding by identifying additional, effective approaches or complementary interventions to address gaps. For example, pharmacist-provider communications were a frequent

component of the studies identified in this review. The CPSTF also recommends complementary intervention approaches. A review of [team-based care to improve blood pressure control](https://www.thecommunityguide.org/findings/cardiovascular-disease-team-based-care-improve-blood-pressure-control) [https://www.thecommunityguide.org/findings/cardiovascular-disease-team-based-care-improve-blood-pressure-control] reported greater effects when pharmacists were included on teams. And the review of [text messaging interventions to increase medication adherence among patients with chronic diseases](https://www.thecommunityguide.org/findings/health-information-technology-text-messaging-medication-adherence-chronic-disease) [https://www.thecommunityguide.org/findings/health-information-technology-text-messaging-medication-adherence-chronic-disease] included cardiovascular risk conditions.

Medication costs are a common and substantial barrier to adherence for patients. Pharmacists may have limited options to address this barrier, and when identified in patient assessments, additional support may be necessary. The CPSTF recommends interventions that combine reduced out-of-pocket costs for blood pressure and cholesterol medications with additional components aimed at improving patient–provider interaction and patient knowledge (e.g., team-based care with medication counseling, patient education).

The studies identified in this review did not evaluate adherence to medications for smoking cessation. Counseling and assisting tobacco-using patients to quit are important contributors to cardiovascular disease risk reduction ([USPSTF](https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/tobacco-use-in-adults-and-pregnant-women-counseling-and-interventions1) [https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/tobacco-use-in-adults-and-pregnant-women-counseling-and-interventions1] 2015). While this review did not evaluate adherence to medications for smoke cessation, pharmacists can play an important role in supporting patient efforts to obtain, initiate, and complete cessation treatments (Saba et al., 2014).

Pharmacists delivered and guided the tailored interventions in the studies identified in this review. While pharmacists or pharmacy residents may need to be involved in decisions about counseling content and additional adherence services for patients, implementers might consider how other staff, such as pharmacy technicians, can support the interventions. Pharmacy technicians might be able to conduct tool-based assessments of patient barriers, provide instruction on the use of patient adherence tools, and deliver adherence reminders.

Community health workers might also be able to play a role. The CPSTF recommends [engaging community health workers for cardiovascular disease prevention](https://www.thecommunityguide.org/findings/cardiovascular-disease-prevention-and-control-interventions-engaging-community-health) [https://www.thecommunityguide.org/findings/cardiovascular-disease-prevention-and-control-interventions-engaging-community-health]. Implementation research could evaluate coordinated work between community health workers and community-based pharmacies in underserved communities.

Pharmacies may have limited space to provide tailored interventions to patients, particularly in community settings. Several studies in this review provided space in the patient’s primary care setting to enable confidential assessments and tailored counseling, and a few studies delivered tailored interventions over the phone.

Evidence Gaps

Additional research and evaluation are needed to answer the following questions and fill existing gaps in the evidence base.

- How does intervention effectiveness vary with different intervention components? Are interventions more effective when tailored options include system-level approaches, such as refill synchronization or blister packaging?

- Within a tailored approach, are some adherence barriers commonly addressed by specific intervention options? Does evidence indicate that some adherence barriers can be removed with a specific component, allowing for some standardization in tailored interventions?
- How effective are tailored interventions when targeted to specific patients at risk for adherence barriers, such as patients with low income or low health-literacy?
- How effective are tailored interventions when implemented in pharmacies that serve minority and low-income communities?
- How effective are tailored interventions that engage community health workers and pharmacy technicians in appropriate assessment, coaching, or follow-up roles?
- Are these interventions cost-effective for patients with existing cardiovascular disease?
- What are the economic outcomes when interventions are implemented in rural areas?
- What are the clinical outcomes associated with reductions in healthcare costs and increases in quality adjusted life years? Economic evaluations will be more helpful if they include patient health outcomes (e.g., blood pressure, cholesterol) in their reports.
- Which components of healthcare use lead to the greatest changes in healthcare cost following implementation?

References

Milosavljevic A, Aspden T, Harrison J. Community pharmacist-led interventions and their impact on patients' medication adherence and other health outcomes: a systematic review. *International Journal of Pharmacy Practice* 2018;26(5):387-97.

Van Driel ML, Morledge MD, Ulep R, et al. Interventions to improve adherence to lipid-lowering medication. *Cochrane Database Syst Rev* 2016.

Patnode CP, Henderson JT, Thompson JH, Senger CA, Fortmann SP, et al. Behavioral Counseling and Pharmacotherapy Interventions for Tobacco Cessation in Adults, Including Pregnant Women: A Review of Reviews for the U.S. Preventive Services Task Force. Evidence Synthesis No. 134. AHRQ Publication No. 14-05200-EF-1. Rockville (MD): Agency for Healthcare Research and Quality; 2015. Available at URL:

<https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/tobacco-use-in-adults-and-pregnant-women-counseling-and-interventions1>

Saba M, Diep J, Saini B, Dhipayom T. Meta-analysis of the effectiveness of smoking cessation interventions in community pharmacy. *Journal of Clinical Pharmacy and Therapeutics* 2014;39(3):240-7.

Disclaimer

The findings and conclusions on this page are those of the Community Preventive Services Task Force and do not necessarily represent those of CDC. Task Force evidence-based recommendations are not mandates for compliance or spending. Instead, they provide information and options for decision makers and stakeholders to consider when determining which programs, services, and policies best meet the needs, preferences, available resources, and constraints of their constituents.

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Appendices of Supporting Documents

Heart Disease and Stroke Prevention: Tailored Pharmacy-based Interventions to Improve Medication Adherence

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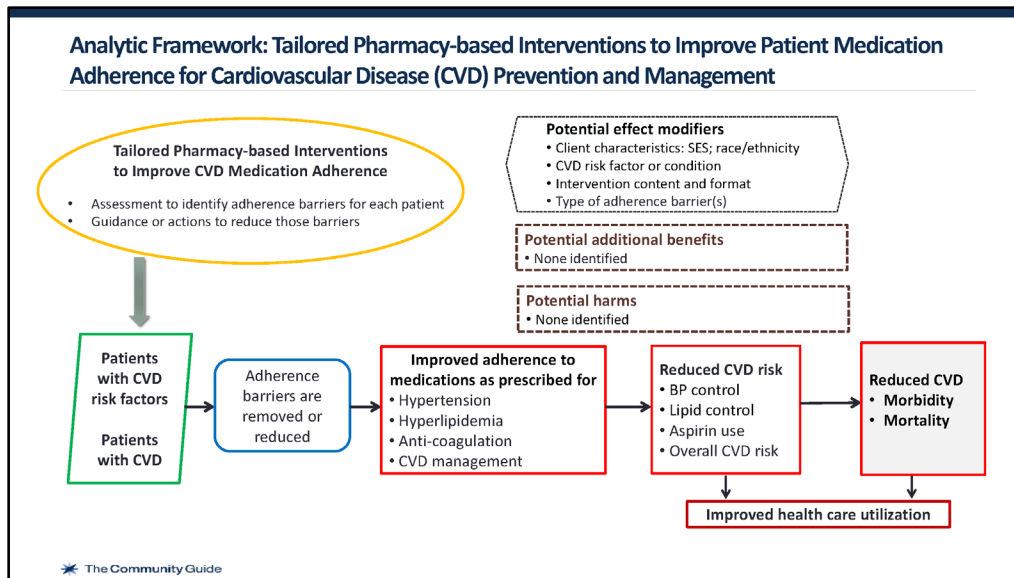
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Appendix A

Analytic Framework (Effectiveness Review)

Heart Disease and Stroke Prevention:

Tailored Pharmacy-based Interventions to Improve Medication Adherence



Analytic Framework Text Description

The framework postulates that tailored interventions delivered to patients with cardiovascular disease (CVD) risk factors or CVD may lead to the reduction or removal of adherence barriers. This is expected to improve patient adherence to prescribed medications for hypertension, hyperlipidemia, anti-coagulation, and CVD management. These outcomes, in turn, would lead to reduced CVD risk related to blood pressure control, lipid control, aspirin use, and overall CVD risk which may lead to reduced CVD morbidity and mortality. These downstream outcomes (e.g., reduced CVD risk and morbidity and mortality) can lead to improvements in health care utilization.

It is not expected that the intervention would lead to potential harms or additional benefits. Potential effect modifiers could include client characteristics such as socioeconomic status (SES) and race or ethnicity, CVD risk factors or conditions, intervention content and format, and type of adherence barriers.

Icons in Community Guide Analytic Frameworks	
Icon	Interpretation
	Intervention
	Recommendation outcome
	Other intermediate outcome/variable (that are not recommendation outcomes)
	Population
	Key Potential Effect Modifiers (affecting causal relationships)
	Additional benefits/Potential Harms/Disparities
	Unidirectional block arrows are applied between intervention and population icons
	Unidirectional arrows for causal relationships
	Bidirectional arrows show feedback loops

Appendix B Search Strategy (Effectiveness Review):

Heart Disease and Stroke Prevention: Tailored Pharmacy-based Interventions to Improve Medication Adherence

A research librarian searched for published studies in the following databases: PubMed, Embase (OVID), PsycINFO (OVID), Medline, Scopus, Cochrane, ERIC, CINAHL, Sociological Abstracts (ProQuest). Additional studies were identified via suggestions from subject matter experts and hand-searches from reference lists.

Studies searched and screened for inclusion were published in English from the beginning of database through August 2018 and were limited to countries with high income economies as defined by the World Bank.

Database: PubMed

#1

"Hypertension"[Mesh] OR "Blood Pressure"[Mesh] OR "Hypercholesterolemia"[Mesh] OR "Cholesterol"[Mesh] OR "Aspirin"[Mesh] OR "hypertension"[Title/Abstract] OR "blood pressure"[Title/Abstract] OR "cholesterol"[Title/Abstract] OR "hypercholesterol"[Title/Abstract] OR "hypercholesterolemia"[Title/Abstract] OR "acetylsalicylic acid"[Title/Abstract] OR "ASA"[Title/Abstract] OR "aspirin"[Title/Abstract] OR "high blood pressure" OR "high cholesterol" OR "high level lipid" OR "high lipid level" OR "high lipid levels" OR "high level lipids" OR hyperlipidemias[MeSH Terms] OR "blood fat" OR "blood fats" OR "blood lipid" OR "blood lipids" OR "lower blood pressure" OR "lowered blood pressure" OR "lower cholesterol" OR "lowered cholesterol" OR "lowering cholesterol" OR "lower lipid" OR "lower lipids" OR "lowered lipid" OR "lowered lipids" OR "lowering lipid" OR "lowering lipids" OR "Antihypertensive Agents"[Mesh] OR "Anticholesterol Agents"[Mesh] OR hypercholesterol*[Title/Abstract] OR hyperlipid*[Title/Abstract] OR "high cholesterol"[Title/Abstract] OR "hmg coa statins"[Title/Abstract] OR hyperlipidemia[MeSH Terms] OR hyperlipidemia OR lipids OR cholesterol OR "statin"[Title/Abstract] OR "hmg coa statins" OR "Hydroxymethylglutaryl-CoA Reductase Inhibitors"[Mesh] OR "cardiovascular disease risk factors" OR "heart disease risk" OR "cardiovascular risk factors" OR "heart attack risk" OR "stroke risk" OR "comprehensive cardiovascular disease risk reduction"[Title/Abstract]

#2

"United Kingdom" OR "United States" OR "Scotland" OR "Wales" OR "England" OR "United States"[MeSH] OR "United Kingdom"[MeSH] OR Andorra OR Antigua OR Barbuda OR Aruba OR Australia OR Austria OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR Brunei OR Darussalam OR Canada OR "Cayman Islands" OR "Channel Islands" OR Chile OR Croatia OR Curacao OR Cyprus OR "Czech Republic" OR Denmark OR Estonia OR "Equatorial Guinea" OR "Faeroe Islands" OR Finland OR France OR "French Polynesia" OR Germany OR Greece OR Greenland OR Guam OR "Hong Kong" OR Iceland OR Ireland OR "Isle of Man" OR Israel OR Italy OR Japan OR Korea OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Netherlands OR "New Caledonia" OR "New Zealand" OR "Northern Mariana Islands" OR Norway OR Oman OR Poland OR Portugal OR "Puerto Rico" OR Qatar OR "Russian Federation" OR Russia OR "San Marino" OR "Saudi Arabia" OR Singapore OR "Sint Maarten" OR "Saint Maarten" OR "St. Martin" OR "Saint Martin" OR "Slovak Republic" OR Slovenia OR Spain OR "St. Kitts" OR Nevis OR Sweden OR Switzerland OR Taiwan OR "Trinidad" OR "Tobago" OR Turks OR Caicos OR Uruguay OR "United Arab Emirates" OR "U.S. Virgin Islands"

#3

Pharmacist* or “pharmacy services” or “pharmaceutical care” or “pharmacy care”

#4

Adherence or nonadherence or compliance or dropout* or persistence or “medication reconciliation” or “medication possession” or compliant or “treatment refusal” or adherent or compliant or persistent or discontinue* or discontinuing OR “Medication Adherence”[Mesh] OR “Patient Compliance”[Mesh]

#5

“medication therapy management” or “patient education” or reminder* or remind or reminds or reminded or reminding or advocating or advocate* or increase* or increasing or improve* or improving or manage or managed or management or collaborate* or collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing or control or controls or controlled or controlling or monitor or monitors or monitored or monitoring or decrease* or decreasing or efficacy* or success* or effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered OR “Guideline Adherence”[Mesh] OR strategy or approach or process or policy or policies or encourage* or enforce* or equity or “provider education” or evaluat* or promotion* or preparation*

#6

#1 AND #2 AND #3 AND #4 AND #5 English[lang]

#7

“cardiovascular disease”[Title/Abstract] OR “cardiovascular diseases”[Title/Abstract] OR “coronary heart disease”[Title/Abstract] OR “coronary heart diseases”[Title/Abstract] or “ischemic”[Title/Abstract] OR “coronary artery disease”[Title/Abstract] OR “coronary artery diseases”[Title/Abstract] OR “heart disease”[Title/Abstract] OR “heart diseases”[Title/Abstract] or “heart attack”[Title/Abstract] OR “heart attacks”[Title/Abstract] OR “stroke”[Title/Abstract] OR “strokes”[Title/Abstract] OR “myocardial infarction”[Title/Abstract] OR myocardial infarctions[Title/Abstract] or “heart failure”[Title/Abstract] OR “cardiovascular disease”[Title/Abstract] OR “cardiovascular diseases”[Title/Abstract] or “cerebrovascular disease”[Title/Abstract] OR “cerebrovascular diseases”[Title/Abstract] OR “cerebrovascular event”[Title/Abstract] OR “cerebrovascular events”[Title/Abstract] OR “angina”[Title/Abstract] OR “coronary disease”[MeSH Terms] OR “coronary artery disease”[MeSH Terms] OR “ischemia”[MeSH Terms] OR “ischemic preconditioning, myocardial”[MeSH Terms] OR “ischemic attack, transient”[MeSH Terms] OR “hypoxia ischemia, brain”[MeSH Terms] OR “myocardial ischemia”[MeSH Terms] OR “heart diseases”[MeSH Terms] OR “myocardial infarction”[MeSH Terms] OR “stroke”[MeSH Terms] OR “cerebrovascular disorders”[MeSH Terms] OR “basal ganglia cerebrovascular disease”[MeSH Terms] OR “angina pectoris”[MeSH Terms] OR cardiomyopathy OR “heart arrhythmia” or “irregular heartbeat” OR “congenital heart disease” OR “valvular heart disease” or “valve heart disease” OR “peripheral artery disease” OR “thromboembolic disease” OR “congestive heart failure” OR atherosclerosis

#8

#2 AND #3 AND #4 AND #5 AND #7 AND English[lang]

#9

#6 OR #8

Database: Embase (OVID)

1. ("Hypertension" or "Blood Pressure" or "Hypercholesterolemia").mp.
2. ("Hypercholesterolemia" or "high blood pressure" or "high cholesterol" or "high level lipid" or "high lipid level" or "high lipid levels" or "high level lipids" or hyperlipidemias or "blood fat" or "blood fats" or "blood lipid" or "blood lipids" or "lower blood pressure lowered blood pressure" or "lower cholesterol" or "lowered cholesterol" or "lowering cholesterol" or "lower lipid" or "lower lipids").mp.
3. ("lowered lipid" or "lowered lipids" or "lowering lipid" or "lowering lipids" or "Antihypertensive Agents" or "Anticholesteremic Agents" or hypercholesterol* or hyperlipid* or "high cholesterol" or "hmg coa statins" or hyperlipidemia or hyperlipidemia or lipids or cholesterol).mp.
4. ("statins" or "statin" or Hydroxymethylglutaryl-CoA Reductase Inhibitors).mp.
5. (cardiovascular disease risk or heart disease risk or cardiovascular risk or heart attack risk or stroke risk).mp.
6. or/1-5
7. (Pharmacist* or pharmacy services or pharmaceutical care or pharmacy care).mp.
8. 6 and 7
9. (Adherence or nonadherence or compliance or dropout* or drop out* or dropped out).mp.
10. (persistence or medication reconciliation or discontinue* or discontinuing or medication possession).mp.
11. (Medication Adherence or compliant or treatment refusal or noncompliant* or non-compliant* or Patient Compliance).mp.
12. (medication therapy management or patient education or reminder* or remind or reminds or reminded or reminding).mp.
13. (improve* or improving or adherent or advocating or advocate* or persistent or increase* or increasing or manage or managed or management or collaborate*).mp.
14. (collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing).mp.
15. (control or controls or controlled or controlling or monitor or monitors or monitored or monitoring).mp.
16. (decrease* or decreasing efficacy* or success*).mp.
17. (support or supportive or supporting or supported or recommend* or centered or Guideline Adherence or Intervention* or strategy or approach or process or policy or policies or encourage* or enforce*).mp.
18. (effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered or discontinue* or discontinuing).mp.

19. (Guideline Adherence or Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or provider education or patient education).mp.

20. (evaluat* or promotion* or preparation*).mp.

21. or/9-11

22. or/12-20

23. (French Polynesia or Germany or Greece or Greenland or Guam or Hong Kong or Iceland or (Ireland or Isle of Man or Israel or Italy or Japan or Korea or Kuwait or Latvia or Liechtenstein) or (Lithuania or Luxembourg or Macao or Malta or Monaco or Netherlands or New Caledonia) or (New Zealand or Northern Mariana Islands or Norway or Oman or Poland or Portugal) or (Puerto Rico or Qatar or Russian Federation or Russia or San Marino or Saudi Arabia)).tw. or (Singapore or Sint Maarten or Saint Maarten or St Martin or Saint Martin or Slovak).af. or (Slovenia or Spain or St Kitts or Nevis or Sweden or Switzerland or Taiwan).af. or (Trinidad or Tobago or Turks or Caicos or Uruguay or United Arab Emirates or U S Virgin Islands).af.

24. (United Kingdom or United States or Scotland or Wales or England or United States or (United Kingdom or Andorra or Antigua or Barbuda or Aruba or Australia or Austria or Bahamas) or (Bahrain or Barbados or Belgium or Bermuda or Brunei or Darussalam or Canada) or (Cayman Islands or Channel Islands or Chile or Croatia or Curacao or Cyprus or Czech Republic) or (Denmark or Estonia or Equatorial Guinea or Faeroe Islands or Finland or France)).af.

25. exp united states/

26. exp united kingdom/

27. or/23-26

28. ("cardiovascular disease" or "cardiovascular diseases").mp.

29. exp cardiovascular disease/

30. coronary heart disease*.mp.

31. ("ischemic" or "coronary artery disease" or "coronary artery diseases" or "heart disease").mp.

32. ("heart diseases" or "heart attack" or "heart attacks" or "stroke" or "strokes" or "myocardial infarction" or myocardial infarctions or "heart failure" or "cardiovascular disease" or "cardiovascular diseases").mp.

33. ("cerebrovascular disease" or "cerebrovascular diseases" or "cerebrovascular event" or "cerebrovascular events" or "angina" or "coronary disease" or "coronary artery disease" or "ischemia" or "myocardial ischemic preconditioning").mp.

34. ("transient ischemic attack" or "brain hypoxia ischemia" or "myocardial ischemia" or "heart diseases" or "myocardial infarction" or "stroke" or "cerebrovascular disorders" or "basal ganglia cerebrovascular disease").mp.

35. (angina pectoris or cardiomyopathy or heart arrhythmia or irregular heartbeat or congenital heart disease or valvular heart disease or valve heart disease or peripheral artery disease).mp.

36. (thromboembolic disease or congestive heart failure or atherosclerosis).mp.

37. or/28-36

38. 8 and 21 and 22 and 27

39. 7 and 21 and 22 and 27 and 37

40. limit 38 to english language

41. limit 39 to english language

42. 40 or 41

Database: PsycINFO (OVID)

1. ("Hypertension" or "Blood Pressure" or "Hypercholesterolemia").mp.

2. ("Hypercholesterolemia" or "high blood pressure" or "high cholesterol" or "high level lipid" or "high lipid level" or "high lipid levels" or "high level lipids" or hyperlipidemias or "blood fat" or "blood fats" or "blood lipid" or "blood lipids" or "lower blood pressure lowered blood pressure" or "lower cholesterol" or "lowered cholesterol" or "lowering cholesterol" or "lower lipid" or "lower lipids").mp.

3. ("lowered lipid" or "lowered lipids" or "lowering lipid" or "lowering lipids" or "Antihypertensive Agents" or "Anticholesteremic Agents" or hypercholesterol* or hyperlipid* or "high cholesterol" or "hmg coa statins" or hyperlipidemia or hyperlipidemia or lipids or cholesterol).mp.

4. ("statins" or "statin" or Hydroxymethylglutaryl-CoA Reductase Inhibitors).mp.

5. (cardiovascular disease risk or heart disease risk or cardiovascular risk or heart attack risk or stroke risk).mp.

6. or/1-5

7. (Pharmacist* or pharmacy services or pharmaceutical care or pharmacy care).mp.

8. 6 and 7

9. (Adherence or nonadherence or compliance or dropout* or drop out* or dropped out).mp.

10. (persistence or medication reconciliation or discontinue* or discontinuing or medication possession).mp.

11. (Medication Adherence or compliant or treatment refusal or noncompliant* or non-compliant* or Patient Compliance).mp.

12. (medication therapy management or patient education or reminder* or remind or reminds or reminded or reminding).mp.
13. (improve* or improving or adherent or advocating or advocate* or persistent or increase* or increasing or manage or managed or management or collaborate*).mp.
14. (collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing).mp.
15. (control or controls or controlled or controlling or monitor or monitors or monitored or monitoring).mp.
16. (decrease* or decreasing efficacy* or success*).mp.
17. (support or supportive or supporting or supported or recommend* or centered or Guideline Adherence or Intervention* or strategy or approach or process or policy or policies or encourage* or enforce*).mp.
18. (effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered or discontinue* or discontinuing).mp.
19. (Guideline Adherence or Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or provider education or patient education).mp.
20. (evaluat* or promotion* or preparation*).mp.
21. or/9-11
22. or/12-20
23. (French Polynesia or Germany or Greece or Greenland or Guam or Hong Kong or Iceland or (Ireland or Isle of Man or Israel or Italy or Japan or Korea or Kuwait or Latvia or Liechtenstein) or (Lithuania or Luxembourg or Macao or Malta or Monaco or Netherlands or New Caledonia) or (New Zealand or Northern Mariana Islands or Norway or Oman or Poland or Portugal) or (Puerto Rico or Qatar or Russian Federation or Russia or San Marino or Saudi Arabia)).tw. or (Singapore or Sint Maarten or Saint Maarten or St Martin or Saint Martin or Slovak).af. or (Slovenia or Spain or St Kitts or Nevis or Sweden or Switzerland or Taiwan).af. or (Trinidad or Tobago or Turks or Caicos or Uruguay or United Arab Emirates or U S Virgin Islands).af.
24. (United Kingdom or United States or Scotland or Wales or England or United States or (United Kingdom or Andorra or Antigua or Barbuda or Aruba or Australia or Austria or Bahamas) or (Bahrain or Barbados or Belgium or Bermuda or Brunei or Darussalam or Canada) or (Cayman Islands or Channel Islands or Chile or Croatia or Curacao or Cyprus or Czech Republic) or (Denmark or Estonia or Equatorial Guinea or Faeroe Islands or Finland or France)).af.
25. exp united states/
26. exp united kingdom/
27. or/23-26

28. ("cardiovascular disease" or "cardiovascular diseases").mp.
29. exp cardiovascular disease/
30. coronary heart disease*.mp.
31. ("ischemic" or "coronary artery disease" or "coronary artery diseases" or "heart disease").mp.
32. ("heart diseases" or "heart attack" or "heart attacks" or "stroke" or "strokes" or "myocardial infarction" or myocardial infarctions or "heart failure" or "cardiovascular disease" or "cardiovascular diseases").mp.
33. ("cerebrovascular disease" or "cerebrovascular diseases" or "cerebrovascular event" or "cerebrovascular events" or "angina" or "coronary disease" or "coronary artery disease" or "ischemia" or "myocardial ischemic preconditioning").mp.
34. ("transient ischemic attack" or "brain hypoxia ischemia" or "myocardial ischemia" or "heart diseases" or "myocardial infarction" or "stroke" or "cerebrovascular disorders" or "basal ganglia cerebrovascular disease").mp.
35. (angina pectoris or cardiomyopathy or heart arrhythmia or irregular heartbeat or congenital heart disease or valvular heart disease or valve heart disease or peripheral artery disease).mp.
36. (thromboembolic disease or congestive heart failure or atherosclerosis).mp.
37. or/28-36
38. 8 and 21 and 22 and 27
39. 7 and 21 and 22 and 27 and 37
40. limit 38 to english language
41. limit 39 to english language
42. 40 or 41

Database: Medline (OVID)

1. ("Hypertension" or "Blood Pressure" or "Hypercholesterolemia").mp.
2. ("Hypercholesterolemia" or "high blood pressure" or "high cholesterol" or "high level lipid" or "high lipid level" or "high lipid levels" or "high level lipids" or hyperlipidemias or "blood fat" or "blood fats" or "blood lipid" or "blood lipids" or "lower blood pressure lowered blood pressure" or "lower cholesterol" or "lowered cholesterol" or "lowering cholesterol" or "lower lipid" or "lower lipids").mp.

3. (“lowered lipid” or “lowered lipids” or “lowering lipid” or “lowering lipids” or “Antihypertensive Agents” or “Anticholesteremic Agents” or hypercholesterol* or hyperlipid* or “high cholesterol” or “hmg coa statins” or hyperlipidemia or hyperlipidemia or lipids or cholesterol).mp.
4. (“statins” or “statin” or Hydroxymethylglutaryl-CoA Reductase Inhibitors).mp.
5. (cardiovascular disease risk or heart disease risk or cardiovascular risk or heart attack risk or stroke risk).mp.
6. or/1-5
7. (Pharmacist* or pharmacy services or pharmaceutical care or pharmacy care).mp.
8. 6 and 7
9. (Adherence or nonadherence or compliance or dropout* or drop out* or dropped out).mp.
10. (persistence or medication reconciliation or discontinue* or discontinuing or medication possession).mp.
11. (Medication Adherence or compliant or treatment refusal or noncompliant* or non-compliant* or Patient Compliance).mp.
12. (medication therapy management or patient education or reminder* or remind or reminds or reminded or reminding).mp.
13. (improve* or improving or adherent or advocating or advocate* or persistent or increase* or increasing or manage or managed or management or collaborate*).mp.
14. (collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing).mp.
15. (control or controls or controlled or controlling or monitor or monitors or monitored or monitoring).mp.
16. (decrease* or decreasing efficacy* or success*).mp.
17. (support or supportive or supporting or supported or recommend* or centered or Guideline Adherence or Intervention* or strategy or approach or process or policy or policies or encourage* or enforce*).mp.
18. (effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered or discontinue* or discontinuing).mp.
19. (Guideline Adherence or Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or provider education or patient education).mp.
20. (evaluat* or promotion* or preparation*).mp.
21. or/9-11
22. or/12-20

23. (French Polynesia or Germany or Greece or Greenland or Guam or Hong Kong or Iceland or (Ireland or Isle of Man or Israel or Italy or Japan or Korea or Kuwait or Latvia or Liechtenstein) or (Lithuania or Luxembourg or Macao or Malta or Monaco or Netherlands or New Caledonia) or (New Zealand or Northern Mariana Islands or Norway or Oman or Poland or Portugal) or (Puerto Rico or Qatar or Russian Federation or Russia or San Marino or Saudi Arabia)).tw. or (Singapore or Sint Maarten or Saint Maarten or St Martin or Saint Martin or Slovak).af. or (Slovenia or Spain or St Kitts or Nevis or Sweden or Switzerland or Taiwan).af. or (Trinidad or Tobago or Turks or Caicos or Uruguay or United Arab Emirates or U S Virgin Islands).af.

24. (United Kingdom or United States or Scotland or Wales or England or United States or (United Kingdom or Andorra or Antigua or Barbuda or Aruba or Australia or Austria or Bahamas) or (Bahrain or Barbados or Belgium or Bermuda or Brunei or Darussalam or Canada) or (Cayman Islands or Channel Islands or Chile or Croatia or Curacao or Cyprus or Czech Republic) or (Denmark or Estonia or Equatorial Guinea or Faeroe Islands or Finland or France)).af.

25. exp united states/

26. exp united kingdom/

27. or/23-26

28. (“cardiovascular disease” or “cardiovascular diseases”).mp.

29. exp cardiovascular disease/

30. coronary heart disease*.mp.

31. (“ischemic” or “coronary artery disease” or “coronary artery diseases” or “heart disease”).mp.

32. (“heart diseases” or “heart attack” or “heart attacks” or “stroke” or “strokes” or “myocardial infarction” or myocardial infarctions or “heart failure” or “cardiovascular disease” or “cardiovascular diseases”).mp.

33. (“cerebrovascular disease” or “cerebrovascular diseases” or “cerebrovascular event” or “cerebrovascular events” or “angina” or “coronary disease” or “coronary artery disease” or “ischemia” or “myocardial ischemic preconditioning”).mp.

34. (“transient ischemic attack” or “brain hypoxia ischemia” or “myocardial ischemia” or “heart diseases” or “myocardial infarction” or “stroke” or “cerebrovascular disorders” or “basal ganglia cerebrovascular disease”).mp.

35. (angina pectoris or cardiomyopathy or heart arrhythmia or irregular heartbeat or congenital heart disease or valvular heart disease or valve heart disease or peripheral artery disease).mp.

36. (thromboembolic disease or congestive heart failure or atherosclerosis).mp.

37. or/28-36

38. 8 and 21 and 22 and 27

39. 7 and 21 and 22 and 27 and 37

40. limit 38 to english language

41. limit 39 to english language

42. 40 or 41

Database: Scopus

#1

TITLE-ABS-KEY ("Hypertension" OR "Blood Pressure" OR "Cholesterol" OR "hypercholesterol*" OR "aspirin" OR "acetylsalicylic acid" or "ASA" OR "high lipid levels" OR "high level lipids" OR "blood fat" OR "blood fats" OR "blood lipid" OR "blood lipids" OR "stroke risk" OR "lower lipid" OR "lower lipids" OR "lowered lipid" OR "lowered lipids" OR "lowering lipid" OR "lowering lipids" OR "Antihypertensive Agents" OR "Anticholesteremic Agents" OR hyperlipid* OR "statins" OR "statin" OR "Hydroxymethylglutaryl-CoA Reductase Inhibitors" or "cardiovascular disease risk" OR "heart disease risk" OR "cardiovascular risk factors" OR "heart attack risk")

#2

TITLE-ABS-KEY ("pharmacist" OR "pharmacists" OR "pharmacy services" OR "pharmaceutical care" OR "pharmacy care")

#3

TITLE-ABS-KEY(adherence OR nonadherence OR compliance OR dropout OR persistence OR "medication reconciliation" OR "medication possession" OR "Medication Adherence" OR "Patient Compliance" OR compliant or adherent OR "treatment refusal" or persistent or dropout* or "drop out" or "dropped out" or discontinue* OR discontinuing)

#4

TITLE-ABS-KEY("medication therapy management" OR reminder OR remind OR reminds OR reminded OR reminding OR improve* OR improving OR advocating OR advocate* OR persistent OR increase* OR increasing OR manage OR managed OR management OR collaborate* OR collaborative OR program OR programs OR programmed OR programming OR intervention* OR strategy OR strategies OR pilot OR reduction OR reduce* OR reducing OR control OR controls OR controlled OR controlling OR monitor OR monitors OR monitored OR monitoring OR decrease* OR decreasing OR efficacy* OR success* OR effect OR effects OR effective* OR counsel* OR support OR supportive OR supporting OR supported OR recommend* OR centered OR "Guideline Adherence" OR Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or "patient education" or "provider education" OR evaluat* or promotion* or preparation*)

#5

TITLE-ABS-KEY (Iceland OR Ireland OR "Isle Of Man" OR Israel OR Italy OR Japan OR Korea OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Netherlands OR "French Polynesia" OR Germany OR Greece OR Greenland OR Guam OR "Hong Kong" OR "United Kingdom" OR Scotland OR Wales OR England OR "United States" OR Andorra OR Antigua OR Barbuda OR Aruba OR Australia OR Austria OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR Brunei OR Darussalam OR Canada OR

“Cayman Islands” OR “Channel Islands” OR Chile OR Croatia OR Curacao OR Cyprus OR “Czech Republic” OR Denmark OR Estonia OR “Equatorial Guinea” OR “Faeroe Islands” OR Finland OR France OR Denmark OR Estonia OR “Equatorial Guinea” OR “Faeroe Islands” OR Finland OR France OR “New Caledonia” OR “New Zealand” OR “Northern Mariana Islands” OR Norway OR Oman OR Poland OR Portugal OR “Puerto Rico” OR Qatar OR “Russian Federation” OR Russia OR “San Marino” OR “Saudi Arabia” OR Singapore OR “Sint Maarten” OR “Saint Maarten” OR “St. Martin” OR “Saint Martin” OR “Slovak Republic” OR Slovenia OR Spain OR “St. Kitts” OR “Saint Kitts” OR Nevis OR Sweden OR Switzerland OR Taiwan OR Trinidad OR Tobago OR Turks OR Caicos OR Uruguay OR “United Arab Emirates” OR “U.S. Virgin Islands”)

#6

#1 AND #2 AND #3 AND #4 AND #5 LIMIT-TO (LANGUAGE , “English”)

#7

TITLE-ABS-KEY(“cardiovascular disease” or “coronary heart disease” or “ischemic” or “coronary artery disease” or “heart disease” or “heart attack” or “stroke” or “myocardial infarction” or “heart failure” or “cardiovascular disease” or “cerebrovascular disease” or “cerebrovascular event” or “angina” or “coronary disease” or “coronary artery disease” or “ischemia” OR cardiomyopathy OR “heart arrhythmia” or “irregular heartbeat” OR “congenital heart disease” OR “valvular heart disease” or “valve heart disease” OR “peripheral artery disease” OR “thromboembolic disease” OR “congestive heart failure” OR atherosclerosis)

#8

#2 AND #3 AND #4 AND #5 AND #7 LIMIT-TO (LANGUAGE , “English”)

#9

#6 OR #8

Database: Cochrane (Wiley)

#1

(pharmacist or pharmacists or “pharmacy services” OR “pharmaceutical care” OR “pharmacy care”):ti,ab,kw

#2 Adherence or nonadherence or compliance or dropout* or persistence or “medication reconciliation” or “medication possession” or compliant or “treatment refusal” or adherent or discontinue* or discontinuing

#3

(medication therapy management or “patient education” or reminder* or remind or reminds or reminded or reminding or improve* or improving or advocating or advocate* or persistent or increase* or increasing or manage or managed or management or collaborate* or collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing or control or controls or controlled or controlling or monitor or monitors or monitored or monitoring or decrease* or decreasing or efficacy* or success* or effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered OR Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or “provider education” or evaluat* or promotion* or preparation):ti,ab

#4

Hypertension OR Blood Pressure OR Cholesterol OR hypercholesterol* OR aspirin OR acetylsalicylic acid OR ASA OR high lipid levels OR high level lipids OR blood fat OR blood fats OR blood lipid OR blood lipids OR stroke risk OR lower lipid OR lower lipids OR lowered lipid OR lowered lipids OR lowering lipid OR lowering lipids OR Antihypertensive Agents OR Anticholesteremic Agents OR hyperlipid* OR statins OR statin OR Hydroxymethylglutaryl-CoA Reductase Inhibitors OR cardiovascular disease risk OR heart disease risk OR cardiovascular risk factors OR heart attack risk OR comprehensive cardiovascular disease risk reduction

#5

“United Kingdom” or “United States” or “Scotland” or “Wales” or “England” or “United States” or “United Kingdom” or Andorra or Antigua or Barbuda or Aruba or Australia or Austria or Bahamas or Bahrain or Barbados or Belgium or Bermuda or Brunei or Darussalam or Canada or “Cayman Islands” or “Channel Islands” or Chile or Croatia or Curacao or Cyprus or “Czech Republic” or Denmark or Estonia or “Equatorial Guinea” or “Faeroe Islands” or Finland or France or “French Polynesia” or Germany or Greece or Greenland or Guam or “Hong Kong” or Iceland or Ireland or “Isle of Man” or Israel or Italy or Japan or Korea or Kuwait or Latvia or Liechtenstein or Lithuania or Luxembourg or Macao or Malta or Monaco or Netherlands or “New Caledonia” or “New Zealand” or “Northern Mariana Islands” or Norway or Oman or Poland or Portugal or “Puerto Rico” or Qatar or “Russian Federation” or Russia or “San Marino” or “Saudi Arabia” or Singapore or “Sint Maarten” or “Saint Maarten” or “St Martin” or “Saint Martin” or “Slovak Republic” or Slovenia or Spain or “St Kitts” or Nevis or Sweden or Switzerland or Taiwan or “Trinidad” or “Tobago” or Turks or Caicos or Uruguay or “United Arab Emirates” or “U S Virgin Islands”

#6

(cardiovascular disease or cardiovascular diseases or coronary heart disease or coronary heart diseases or ischemic or coronary artery disease or coronary artery diseases or heart disease or heart diseases or heart attack or heart attacks or stroke or strokes or myocardial infarction or myocardial infarctions or heart failure or cerebrovascular disease or cerebrovascular diseases or cerebrovascular event or cerebrovascular events or angina or coronary disease or coronary artery disease or ischemia or ischemic myocardial preconditioning or ischemic attack or hypoxia ischemia or myocardial ischemia or heart diseases or myocardial infarction or stroke or cerebrovascular disorders or basal ganglia cerebrovascular disease or angina pectoris or cardiomyopathy OR heart arrhythmia or irregular heartbeat OR congenital heart disease OR valvular heart disease or valve heart disease OR peripheral artery disease OR thromboembolic disease OR congestive heart failure OR atherosclerosis):ti,ab

#7

#1 AND #2 AND #3 AND #4 AND #5

#8

#1 AND #2 AND #3 AND #5 AND #6

#9

#7 or #8

Limit to English

Database: ERIC (ProQuest)

1

pharmacist or pharmacists or “pharmacy services” OR “pharmaceutical care” OR “pharmacy care”

2

Adherence or nonadherence or compliance or dropout* or persistence or “medication reconciliation” or “medication possession” or compliant or “treatment refusal” or adherent or persistent or discontinue* or discontinuing or “Medication Adherence” OR “Patient Compliance” or dropout* or “drop out” or “drop outs” or “dropped out”

3

“medication therapy management” or “patient education” or reminder* or remind or reminds or reminded or reminding or improve* or improving or advocating or advocate* or increase* or increasing or manage or managed or management or collaborate* or collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing or control or controls or controlled or controlling or monitor or monitors or monitored or monitoring or decrease* or decreasing or efficacy* or success* or effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered OR “Guideline Adherence” OR Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or “provider education” or “patient education” OR evaluat* or promotion* or preparation*

4

“Hypertension” OR “Blood Pressure” OR “Cholesterol” OR hypercholesterol* OR “aspirin” OR “acetylsalicylic acid” or “ASA” OR “high lipid levels” OR “high level lipids” OR “blood fat” OR “blood fats” OR “blood lipid” OR “blood lipids” OR “stroke risk” OR “lower lipid” OR “lower lipids” OR “lowered lipid” OR “lowered lipids” OR “lowering lipid” OR “lowering lipids” OR “Antihypertensive Agents” OR “Anticholesteremic Agents” OR hyperlipid* OR “statins” OR “statin” OR “Hydroxymethylglutaryl-CoA Reductase Inhibitors” OR “cardiovascular disease risk” OR “heart disease risk” OR “cardiovascular risk factors” OR “heart attack risk”

5

“cardiovascular disease” or “cardiovascular diseases” or “coronary heart disease” or “coronary heart diseases” or “ischemic” or “coronary artery disease” or “coronary artery diseases” or “heart disease” or “heart diseases” or “heart attack” or “heart attacks” or “stroke” or “strokes” or “myocardial infarction” or “myocardial infarctions” or “heart failure” or “cerebrovascular disease” or “cerebrovascular diseases” or “cerebrovascular event” or “cerebrovascular events” or “angina” or “coronary disease” or “coronary artery disease” or “ischemia” or “ischemic preconditioning, myocardial” or “ischemic attack, transient” or “hypoxia ischemia, brain” or “myocardial ischemia” or “heart diseases” or “myocardial infarction” or “stroke” or “cerebrovascular disorders” or “basal ganglia cerebrovascular disease” or “angina pectoris” or cardiomyopathy OR “heart arrhythmia” or “irregular heartbeat” OR “congenital heart disease” OR “valvular heart disease” or “valve heart disease” OR “peripheral artery disease” OR “thromboembolic disease” OR “congestive heart failure” OR atherosclerosis

6

Iceland OR Ireland OR “Isle Of Man” OR Israel OR Italy OR Japan OR Korea OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Netherlands OR “French Polynesia” OR

Germany OR Greece OR Greenland OR Guam OR “Hong Kong” OR “United Kingdom” OR Scotland OR Wales OR England OR “United States” OR Andorra OR Antigua OR Barbuda OR Aruba OR Australia OR Austria OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR Brunei OR Darussalam OR Canada OR “Cayman Islands” OR “Channel Islands” OR Chile OR Croatia OR Curacao OR Cyprus OR “Czech Republic” OR Denmark OR Estonia OR “Equatorial Guinea” OR “Faeroe Islands” OR Finland OR France OR Denmark OR Estonia OR “Equatorial Guinea” OR “Faeroe Islands” OR Finland OR France OR “New Caledonia” OR “New Zealand” OR “Northern Mariana Islands” OR Norway OR Oman OR Poland OR Portugal OR “Puerto Rico” OR Qatar OR “Russian Federation” OR Russia OR “San Marino” OR “Saudi Arabia” OR Singapore OR “Sint Maarten” OR “Saint Maarten” OR “St. Martin” OR “Saint Martin” OR “Slovak Republic” OR Slovenia OR Spain OR “St. Kitts” OR “Saint Kitts” OR Nevis OR Sweden OR Switzerland OR Taiwan OR Trinidad OR Tobago OR Turks OR Caicos OR Uruguay OR “United Arab Emirates” OR “U.S. Virgin Islands”

7

1 AND 2 AND 3 AND 4 AND 6

8

1 AND 2 AND 3 AND 5 AND 6

9

7 OR 8

Database: Sociological Abstracts (ProQuest)

1

pharmacist or pharmacists or “pharmacy services” OR “pharmaceutical care” OR “pharmacy care”

2

Adherence or nonadherence or compliance or dropout* or persistence or “medication reconciliation” or “medication possession” or compliant or “treatment refusal” or persistent or discontinue* or discontinuing or dropout* or “drop out” or “drop outs” or “dropped out”

3

“medication therapy management” or “patient education” or reminder* or remind or reminds or reminded or reminding or improve* or improving or adherent or advocating or advocate* or increase* or increasing or manage or managed or management or collaborate* or collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing or control or controls or controlled or controlling or monitor or monitors or monitored or monitoring or decrease* or decreasing or efficacy* or success* or effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered or discontinue* or discontinuing OR “Guideline Adherence” OR “Medication Adherence” OR “Patient Compliance” OR Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or “provider education” or evaluat* or promotion* or preparation*

4

“Hypertension” OR “Blood Pressure” OR “Cholesterol” OR hypercholesterol* OR “aspirin” OR “acetylsalicylic

acid” or “ASA” OR “high lipid levels” OR “high level lipids” OR “blood fat” OR “blood fats” OR “blood lipid” OR “blood lipids” OR “stroke risk” OR “lower lipid” OR “lower lipids” OR “lowered lipid” OR “lowered lipids” OR “lowering lipid” OR “lowering lipids” OR “Antihypertensive Agents” OR “Anticholesteremic Agents” OR hyperlipid* OR “statins” OR “statin” OR “Hydroxymethylglutaryl-CoA Reductase Inhibitors” OR “cardiovascular disease risk” OR “heart disease risk” OR “cardiovascular risk factors” OR “heart attack risk”

5

“cardiovascular disease” or “cardiovascular diseases” or “coronary heart disease” or “coronary heart diseases” or “ischemic” or “coronary artery disease” or “coronary artery diseases” or “heart disease” or “heart diseases” or “heart attack” or “heart attacks” or “stroke” or “strokes” or “myocardial infarction” or “myocardial infarctions” or “heart failure” or “cerebrovascular disease” or “cerebrovascular diseases” or “cerebrovascular event” or “cerebrovascular events” or “angina” or “coronary disease” or “coronary artery disease” or “ischemia” or “ischemic preconditioning, myocardial” or “ischemic attack, transient” or “hypoxia ischemia, brain” or “myocardial ischemia” or “heart diseases” or “myocardial infarction” or “stroke” or “cerebrovascular disorders” or “basal ganglia cerebrovascular disease” or “angina pectoris” or cardiomyopathy OR “heart arrhythmia” or “irregular heartbeat” OR “congenital heart disease” OR “valvular heart disease” or “valve heart disease” OR “peripheral artery disease” OR “thromboembolic disease” OR “congestive heart failure” OR atherosclerosis

6

Iceland OR Ireland OR “Isle Of Man” OR Israel OR Italy OR Japan OR Korea OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Netherlands OR “French Polynesia” OR Germany OR Greece OR Greenland OR Guam OR “Hong Kong” OR “United Kingdom” OR Scotland OR Wales OR England OR “United States” OR Andorra OR Antigua OR Barbuda OR Aruba OR Australia OR Austria OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR Brunei OR Darussalam OR Canada OR “Cayman Islands” OR “Channel Islands” OR Chile OR Croatia OR Curacao OR Cyprus OR “Czech Republic” OR Denmark OR Estonia OR “Equatorial Guinea” OR “Faeroe Islands” OR Finland OR France OR Denmark OR Estonia OR “Equatorial Guinea” OR “Faeroe Islands” OR Finland OR France OR “New Caledonia” OR “New Zealand” OR “Northern Mariana Islands” OR Norway OR Oman OR Poland OR Portugal OR “Puerto Rico” OR Qatar OR “Russian Federation” OR Russia OR “San Marino” OR “Saudi Arabia” OR Singapore OR “Sint Maarten” OR “Saint Maarten” OR “St. Martin” OR “Saint Martin” OR “Slovak Republic” OR Slovenia OR Spain OR “St. Kitts” OR “Saint Kitts” OR Nevis OR Sweden OR Switzerland OR Taiwan OR Trinidad OR Tobago OR Turks OR Caicos OR Uruguay OR “United Arab Emirates” OR “U.S. Virgin Islands”

7

1 AND 2 AND 3 AND 4 AND 6

8

1 AND 2 AND 3 AND 5 AND 6

9

6 OR 7

Database: CINAHL (EbscoHost)

Search modes – Boolean/Phrase

Limiters – Language: English

S1

pharmacist or pharmacists or “pharmacy services” OR “pharmaceutical care” OR “pharmacy care”

S2

“Hypertension” OR “Blood Pressure” OR “Cholesterol” OR hypercholesterol* OR “aspirin” OR “acetylsalicylic acid” or “ASA” OR “high lipid levels” OR “high level lipids” OR “blood fat” OR “blood fats” OR “blood lipid” OR “blood lipids” OR “stroke risk” OR “lower lipid” OR “lower lipids” OR “lowered lipid” OR “lowered lipids” OR “lowering lipid” OR “lowering lipids” OR “Antihypertensive Agents” OR “Anticholesteremic Agents” OR hyperlipid* OR “statins” OR “statin” OR “Hydroxymethylglutaryl-CoA Reductase Inhibitors” OR “cardiovascular disease risk” OR “heart disease risk” OR “cardiovascular risk factors” OR “heart attack risk” OR “cardiovascular disease” or “cardiovascular diseases” or “coronary heart disease” or “coronary heart diseases” or “ischemic” or “coronary artery disease” or “coronary artery diseases” or “heart disease” or “heart diseases” or “heart attack” or “heart attacks” or “stroke” or “strokes” or “myocardial infarction” or “myocardial infarctions” or “heart failure” or “cerebrovascular disease” or “cerebrovascular diseases” or “cerebrovascular event” or “cerebrovascular events” or “angina” or “coronary disease” or “coronary artery disease” or “ischemia” or “ischemic preconditioning, myocardial” or “ischemic attack, transient” or “hypoxia ischemia, brain” or “myocardial ischemia” or “heart diseases” or “myocardial infarction” or “stroke” or “cerebrovascular disorders” or “basal ganglia cerebrovascular disease” or “angina pectoris” or cardiomyopathy OR “heart arrhythmia” or “irregular heartbeat” OR “congenital heart disease” OR “valvular heart disease” or “valve heart disease” OR “peripheral artery disease” OR “thromboembolic disease” OR “congestive heart failure” OR atherosclerosis

S3

“medication therapy management” or “patient education” or reminder* or remind or reminds or reminded or reminding or improve* or improving or adherent or advocating or advocate* or increase* or increasing or manage or managed or management or collaborate* or collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing or control or controls or controlled or controlling or monitor or monitors or monitored or monitoring or decrease* or decreasing or efficacy* or success* or effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered or discontinue* or discontinuing OR “Guideline Adherence” OR “Medication Adherence” OR “Patient Compliance” OR Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or “provider education” or evaluat* or promotion* or preparation*

S4

Adherence or nonadherence or compliance or dropout* or persistence or “medication reconciliation” or “medication possession” or compliant or “treatment refusal or ” OR “Medication Adherence” OR “Patient Compliance” or adherent or discontinue* or discontinuing OR persistent or compliant

S5

“medication therapy management” or “patient education” or reminder* or remind or reminds or reminded or reminding or improve* or improving or advocating or advocate* or increase* or increasing or manage or managed or management or collaborate* or collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing or control or controls or controlled or controlling or monitor or monitors or monitored or monitoring or decrease* or decreasing or efficacy* or success* or effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered or “Guideline Adherence” OR Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or “provider education” or evaluat* or promotion* or preparation*

S6

Iceland OR Ireland OR “Isle Of Man” OR Israel OR Italy OR Japan OR Korea OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Netherlands OR “French Polynesia” OR Germany OR Greece OR Greenland OR Guam OR “Hong Kong” OR “United Kingdom” OR Scotland OR Wales OR England OR “United States” OR Andorra OR Antigua OR Barbuda OR Aruba OR Australia OR Austria OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR Brunei OR Darussalam OR Canada OR “Cayman Islands” OR “Channel Islands” OR Chile OR Croatia OR Curacao OR Cyprus OR “Czech Republic” OR Denmark OR Estonia OR “Equatorial Guinea” OR “Faeroe Islands” OR Finland OR France OR Denmark OR Estonia OR “Equatorial Guinea” OR “Faeroe Islands” OR Finland OR France OR “New Caledonia” OR “New Zealand” OR “Northern Mariana Islands” OR Norway OR Oman OR Poland OR Portugal OR “Puerto Rico” OR Qatar OR “Russian Federation” OR Russia OR “San Marino” OR “Saudi Arabia” OR Singapore OR “Sint Maarten” OR “Saint Maarten” OR “St. Martin” OR “Saint Martin” OR “Slovak Republic” OR Slovenia OR Spain OR “St. Kitts” OR “Saint Kitts” OR Nevis OR Sweden OR Switzerland OR Taiwan OR Trinidad OR Tobago OR Turks OR Caicos OR Uruguay OR “United Arab Emirates” OR “U.S. Virgin Islands”

S7

S1 AND S2 AND S4 AND S5 AND S6

S8

S1 AND S3 AND S4 AND S5 AND 6

S9

S7 OR S8

Appendix C
Included Studies (Effectiveness Review):
Heart Disease and Stroke Prevention:
Tailored Pharmacy-based Interventions to Improve Medication Adherence

The number of studies and publications do not always correspond (e.g., a publication may include several studies or one study may be explained in several publications).

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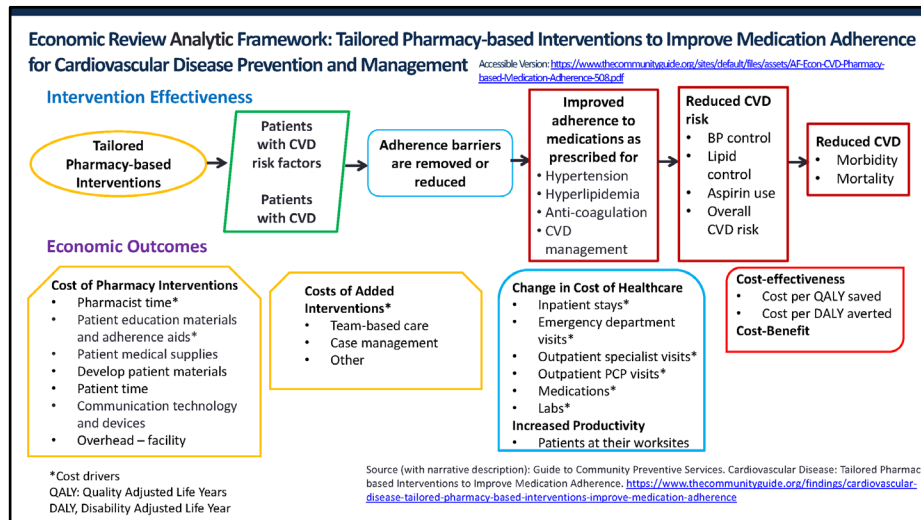
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Appendix D

Analytic Framework (Economic Review)

Heart Disease and Stroke Prevention: Tailored Pharmacy-based Interventions to Improve Medication Adherence



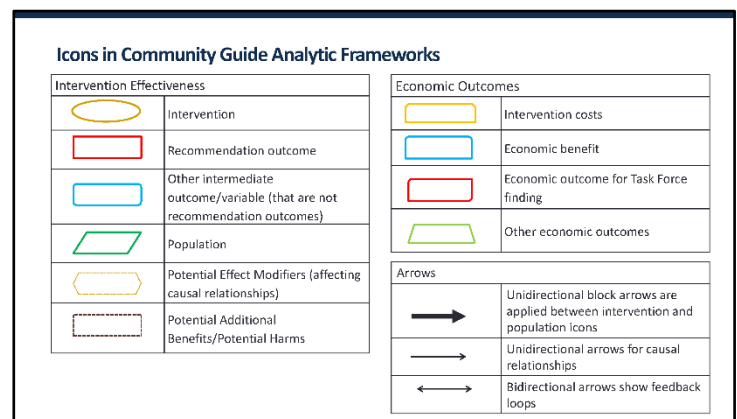
Analytic Framework Text Description

The analytic framework postulates that effective tailored interventions delivered to patients with cardiovascular disease (CVD) or risk factors for CVD will reduce or remove medication adherence barriers. This would be expected to improve patient adherence to medications prescribed for hypertension, hyperlipidemia, anti-coagulation, and CVD management. It is postulated this improved adherence would reduce CVD risk by improving blood pressure and lipid control and increasing aspirin use, and ultimately reduce and CVD morbidity and mortality.

The economic review identified the cost of pharmacists' time and the cost of patient education materials and adherence aids as cost drivers. Other intervention costs include patient medical supplies, development of patient materials, patient time, communication technology and devices, and overhead costs (e.g., facilities). Team-based care, case management, or other interventions would be considered cost drivers if added to the medication adherence intervention.

The economic review identified the costs of inpatient stays, emergency department visits, outpatient specialist and primary care provider visits, medications, and labs as cost drivers for the change in healthcare cost. Reduced morbidity and mortality related to CVD are expected to increase the productivity of patients at their worksites and increase both the quality and quantity of additional life years lived.

The framework conceptualizes summary economic outcomes as cost-benefit or cost-effectiveness. Cost-benefit is the ratio of averted healthcare cost and increased productivity to the intervention cost. Cost-effectiveness is net cost per additional quality adjusted life year saved or disability-adjusted life year averted.



Appendix E Search Strategy (Economic Review):

Heart Disease and Stroke Prevention: Tailored Pharmacy-based Interventions to Improve Medication Adherence

In June 2019, a research librarian used the terms listed below to search the following databases: PubMed, Embase, PsycINFO, Medline, Scopus, Cochrane, ERIC, CINAHL, Sociological Abstracts, and EconLit. The search period covered July 2018 through May 2019, bridging the search performed for the effectiveness review (through August 2018).

The search was limited to high income countries as defined by the World Bank. The review team also screened reference lists of included studies and consulted subject matter experts about additional studies that may have been missed. Search terms and strategies were adjusted for each database, based on controlled and uncontrolled vocabularies and software.

Database: PubMed

Date Searched : 6/4/2019

Results: 4

Search Strategy:

#1

"Hypertension"[Mesh] OR "Blood Pressure"[Mesh] OR "Hypercholesterolemia"[Mesh] OR "Cholesterol"[Mesh] OR "Aspirin"[Mesh] OR "hypertension"[Title/Abstract] OR "blood pressure"[Title/Abstract] OR "cholesterol"[Title/Abstract] OR "hypercholesterol"[Title/Abstract] OR "hypercholesterolemia"[Title/Abstract] OR "acetylsalicylic acid"[Title/Abstract] OR "ASA"[Title/Abstract] OR "aspirin"[Title/Abstract] OR "high blood pressure" OR "high cholesterol" OR high level lipid OR high lipid levels OR hyperlipidemias[MeSH Terms] OR "blood fat" OR "blood fats" OR "blood lipid" OR "blood lipids" OR "lower blood pressure" "lowered blood pressure" OR "lower cholesterol" OR "lowered cholesterol" OR "lowering cholesterol" OR "lower lipid" OR "lower lipids" OR "lowered lipid" OR "lowered lipids" OR "lowering lipid" OR "lowering lipids" OR "Antihypertensive Agents"[Mesh] OR "Anticholesteremic Agents"[Mesh] OR hypercholesterol*[Title/Abstract] OR hyperlipid*[Title/Abstract] OR "high cholesterol"[Title/Abstract] OR "hmg coa statins"[Title/Abstract] OR hyperlipidemia[MeSH Terms] OR hyperlipidemia OR lipids OR cholesterol OR "statin"[Title/Abstract] OR "hmg coa statins" OR "Hydroxymethylglutaryl-CoA Reductase Inhibitors"[Mesh] OR "cardiovascular disease risk factors" OR "heart disease risk" OR "cardiovascular risk factors" OR "heart attack risk" OR "stroke risk" OR "comprehensive cardiovascular disease risk reduction"[Title/Abstract]

#2

"United Kingdom" OR "United States" OR "Scotland" OR "Wales" OR "England" OR "United States"[MeSH] OR "United Kingdom"[MeSH] OR Andorra OR Antigua OR Barbuda OR Aruba OR Australia OR Austria OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR Brunei OR Darussalam OR Canada OR "Cayman Islands" OR "Channel Islands" OR Chile OR Croatia OR Curacao OR Cyprus OR "Czech Republic" OR Denmark OR Estonia OR "Equatorial Guinea" OR "Faeroe Islands" OR Finland OR France OR "French Polynesia" OR Germany OR Greece OR Greenland OR Guam OR "Hong Kong" OR Iceland OR Ireland OR "Isle of Man" OR Israel OR Italy OR Japan OR Korea OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Netherlands OR "New Caledonia" OR "New Zealand" OR "Northern Mariana Islands" OR Norway OR Oman OR Poland OR Portugal OR "Puerto Rico" OR Qatar OR "Russian Federation" OR Russia OR "San Marino"

OR “Saudi Arabia” OR Singapore OR “Sint Maarten” OR “Saint Maarten” OR “St. Martin” OR “Saint Martin” OR “Slovak Republic” OR Slovenia OR Spain OR “St. Kitts” OR Nevis OR Sweden OR Switzerland OR Taiwan OR “Trinidad” OR “Tobago” OR Turks OR Caicos OR Uruguay OR “United Arab Emirates” or “U.S. Virgin Islands”

#3

Pharmacist* or “pharmacy services” or “pharmaceutical care” or “pharmacy care”

#4

Adherence or nonadherence or compliance or dropout* or persistence or “medication reconciliation” or “medication possession” or compliant or “treatment refusal” or adherent or compliant or persistent or discontinue* or discontinuing OR “Medication Adherence”[Mesh] OR “Patient Compliance”[Mesh]

#5

“medication therapy management” or “patient education” or reminder* or remind or reminds or reminded or reminding or advocating or advocate* or increase* or increasing or improve* or improving or manage or managed or management or collaborate* or collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing or control or controls or controlled or controlling or monitor or monitors or monitored or monitoring or decrease* or decreasing or efficacy* or success* or effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered OR “Guideline Adherence”[Mesh] OR strategy or approach or process or policy or policies or encourage* or enforce* or equity or “provider education” or evaluat* or promotion* or preparation*

#26 (cost[Text Word] OR cost effective[Text Word] OR cost benefit[Text Word]) OR “economics”[Subheading] OR “costs and cost analysis”[MeSH Terms] OR “cost-benefit analysis”[MeSH Terms]

#28 (#1 AND #2 AND #3 AND #4 AND #5 AND #26) English[lang]

#29 “cardiovascular disease”[Title/Abstract] OR “cardiovascular diseases”[Title/Abstract] OR “coronary heart disease”[Title/Abstract] OR “coronary heart diseases”[Title/Abstract] or “ischemic”[Title/Abstract] OR “coronary artery disease”[Title/Abstract] OR “coronary artery diseases”[Title/Abstract] OR “heart disease”[Title/Abstract] OR “heart diseases”[Title/Abstract] or “heart attack”[Title/Abstract] OR “heart attacks”[Title/Abstract] OR “stroke”[Title/Abstract] OR “strokes”[Title/Abstract] OR “myocardial infarction”[Title/Abstract] OR myocardial infarctions[Title/Abstract] or “heart failure”[Title/Abstract] OR “cardiovascular disease”[Title/Abstract] OR “cardiovascular diseases”[Title/Abstract] or “cerebrovascular disease”[Title/Abstract] OR “cerebrovascular diseases”[Title/Abstract] OR “cerebrovascular event”[Title/Abstract] OR “cerebrovascular events”[Title/Abstract] OR “angina”[Title/Abstract] OR “coronary disease”[MeSH Terms] OR “coronary artery disease”[MeSH Terms] OR “ischemia”[MeSH Terms] OR “ischemic preconditioning, myocardial”[MeSH Terms] OR “ischemic attack, transient”[MeSH Terms] OR “hypoxia ischemia, brain”[MeSH Terms] OR “myocardial ischemia”[MeSH Terms] OR “heart diseases”[MeSH Terms] OR “myocardial infarction”[MeSH Terms] OR “stroke”[MeSH Terms] OR “cerebrovascular disorders”[MeSH Terms] OR “basal ganglia cerebrovascular disease”[MeSH Terms] OR “angina pectoris”[MeSH Terms] OR cardiomyopathy OR “heart arrhythmia” or “irregular heartbeat” OR “congenital heart disease” OR “valvular heart disease” or “valve heart disease” OR “peripheral artery disease” OR “thromboembolic disease” OR “congestive heart failure” OR atherosclerosis

#36 (#2 AND #3 AND #4 AND #5 AND #26 AND #29) English[lang]

#28 OR #36

Publication date from 2018/07/01 to 2019/05/31

Database: Embase (OVID)

Date Searched : 6/4/2019

Results: 41

Search Strategy:

1 ("Hypertension" or "Blood Pressure" or "Hypercholesterolemia").mp.

2 ("Hypercholesterolemia" or "high blood pressure" or "high cholesterol" or "high level lipid" or "high lipid level" or "high lipid levels" or "high level lipids" or hyperlipidemias or "blood fat" or "blood fats" or "blood lipid" or "blood lipids" or "lower blood pressure lowered blood pressure" or "lower cholesterol" or "lowered cholesterol" or "lowering cholesterol" or "lower lipid" or "lower lipids").mp.

3 ("lowered lipid" or "lowered lipids" or "lowering lipid" or "lowering lipids" or "Antihypertensive Agents" or "Anticholesteremic Agents" or hypercholesterol* or hyperlipid* or "high cholesterol" or "hmg coa statins" or hyperlipidemia or hyperlipidemia or lipids or cholesterol).mp.

4 ("statins" or "statin" or Hydroxymethylglutaryl-CoA Reductase Inhibitors).mp.

5 (cardiovascular disease risk or heart disease risk or cardiovascular risk or heart attack risk or stroke risk).mp.

6 or/1-5

7 (Pharmacist* or pharmacy services or pharmaceutical care or pharmacy care).mp.

8 6 and 7

9 (Adherence or nonadherence or compliance or dropout* or drop out* or dropped out).mp.

10 (persistence or medication reconciliation or discontinue* or discontinuing or medication possession).mp.

11 (Medication Adherence or compliant or treatment refusal or noncompliant* or non-compliant* or Patient Compliance).mp.

12 (medication therapy management or patient education or reminder* or remind or reminds or reminded or reminding).mp.

13 (improve* or improving or adherent or advocating or advocate* or persistent or increase* or increasing or manage or managed or management or collaborate*).mp.

14 (collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing).mp.

15 (control or controls or controlled or controlling or monitor or monitors or monitored or monitoring).mp.

16 (decrease* or decreasing efficacy* or success*).mp.

17 (support or supportive or supporting or supported or recommend* or centered or Guideline Adherence or Intervention* or strategy or approach or process or policy or policies or encourage* or enforce*).mp.

18 (effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered or discontinue* or discontinuing).mp.

19 (Guideline Adherence or Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or provider education or patient education).mp.

20 (evaluat* or promotion* or preparation*).mp.

21 or/9-11

22 or/12-20

23 (French Polynesia or Germany or Greece or Greenland or Guam or Hong Kong or Iceland or (Ireland or Isle of Man or Israel or Italy or Japan or Korea or Kuwait or Latvia or Liechtenstein) or (Lithuania or Luxembourg or Macao or Malta or Monaco or Netherlands or New Caledonia) or (New Zealand or Northern Mariana Islands or Norway or Oman or Poland or Portugal) or (Puerto Rico or Qatar or Russian Federation or Russia or San Marino or Saudi Arabia)).tw. or (Singapore or Sint Maarten or Saint Maarten or St Martin or Saint Martin or Slovak).af. or (Slovenia or Spain or St Kitts or Nevis or Sweden or Switzerland or Taiwan).af. or (Trinidad or Tobago or Turks or Caicos or Uruguay or United Arab Emirates or U S Virgin Islands).af.

24 (United Kingdom or United States or Scotland or Wales or England or United States or (United Kingdom or Andorra or Antigua or Barbuda or Aruba or Australia or Austria or Bahamas) or (Bahrain or Barbados or Belgium or Bermuda or Brunei or Darussalam or Canada) or (Cayman Islands or Channel Islands or Chile or Croatia or Curacao or Cyprus or Czech Republic) or (Denmark or Estonia or Equatorial Guinea or Faeroe Islands or Finland or France)).af.

25 exp united states/

26 exp united kingdom/

27 or/23-26

28 ("cardiovascular disease" or "cardiovascular diseases").mp.

29 exp cardiovascular disease/

30 coronary heart disease*.mp.

31 ("ischemic" or "coronary artery disease" or "coronary artery diseases" or "heart disease").mp.

32 ("heart diseases" or "heart attack" or "heart attacks" or "stroke" or "strokes" or "myocardial infarction" or myocardial infarctions or "heart failure" or "cardiovascular disease" or "cardiovascular diseases").mp.

33 ("cerebrovascular disease" or "cerebrovascular diseases" or "cerebrovascular event" or "cerebrovascular events" or "angina" or "coronary disease" or "coronary artery disease" or "ischemia" or "myocardial ischemic preconditioning").mp.

34 ("transient ischemic attack" or "brain hypoxia ischemia" or "myocardial ischemia" or "heart diseases" or "myocardial infarction" or "stroke" or "cerebrovascular disorders" or "basal ganglia cerebrovascular disease").mp.

35 (angina pectoris or cardiomyopathy or heart arrhythmia or irregular heartbeat or congenital heart disease or valvular heart disease or valve heart disease or peripheral artery disease).mp.

36 (thromboembolic disease or congestive heart failure or atherosclerosis).mp.

37 or/28-36

38 exp Economics/ or exp "Costs and Cost Analysis"/

39 (cost or costs or economic or economics or benefit).mp.

40 or/38-39

41 (201807* or 201808* or 201809* or 201810* or 201811* or 201812* or 2019*).dc.

42 8 and 21 and 22 and 27 and 40 and 41

43 7 and 21 and 22 and 27 and 37 and 40 and 41

44 limit 42 to english language

45 limit 43 to english language

46 44 or 45

Database: PsycINFO(OVID)

Date Searched : 5/28/2019

Results: 0

Search Strategy:

1 ("Hypertension" or "Blood Pressure" or "Hypercholesterolemia").mp.

2 ("Hypercholesterolemia" or "high blood pressure" or "high cholesterol" or "high level lipid" or "high lipid level" or "high lipid levels" or "high level lipids" or hyperlipidemias or "blood fat" or "blood fats" or "blood lipid" or "blood lipids" or "lower blood pressure lowered blood pressure" or "lower cholesterol" or "lowered cholesterol" or "lowering cholesterol" or "lower lipid" or "lower lipids").mp.

3 ("lowered lipid" or "lowered lipids" or "lowering lipid" or "lowering lipids" or "Antihypertensive Agents" or "Anticholesteremic Agents" or hypercholesterol* or hyperlipid* or "high cholesterol" or "hmg coa statins" or hyperlipidemia or hyperlipidemia or lipids or cholesterol).mp.

4 ("statins" or "statin" or Hydroxymethylglutaryl-CoA Reductase Inhibitors).mp.

5 (cardiovascular disease risk or heart disease risk or cardiovascular risk or heart attack risk or stroke risk).mp.

6 or/1-5

7 (Pharmacist* or pharmacy services or pharmaceutical care or pharmacy care).mp.

8 6 and 7

9 (Adherence or nonadherence or compliance or dropout* or drop out* or dropped out).mp.

10 (persistence or medication reconciliation or discontinue* or discontinuing or medication possession).mp.

11 (Medication Adherence or compliant or treatment refusal or noncompliant* or non-compliant* or Patient Compliance).mp.

12 (medication therapy management or patient education or reminder* or remind or reminds or reminded or reminding).mp.

13 (improve* or improving or adherent or advocating or advocate* or persistent or increase* or increasing or manage or managed or management or collaborate*).mp.

14 (collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing).mp.

15 (control or controls or controlled or controlling or monitor or monitors or monitored or monitoring).mp.

16 (decrease* or decreasing efficacy* or success*).mp.

17 (support or supportive or supporting or supported or recommend* or centered or Guideline Adherence or Intervention* or strategy or approach or process or policy or policies or encourage* or enforce*).mp.

18 (effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered or discontinue* or discontinuing).mp.

19 (Guideline Adherence or Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or provider education or patient education).mp.

20 (evaluat* or promotion* or preparation*).mp.

21 or/9-11

22 or/12-20

23 (French Polynesia or Germany or Greece or Greenland or Guam or Hong Kong or Iceland or (Ireland or Isle of Man or Israel or Italy or Japan or Korea or Kuwait or Latvia or Liechtenstein) or (Lithuania or Luxembourg or Macao or Malta or Monaco or Netherlands or New Caledonia) or (New Zealand or Northern Mariana Islands or Norway or Oman or Poland or Portugal) or (Puerto Rico or Qatar or Russian Federation or Russia or San Marino or Saudi Arabia)).tw. or (Singapore or Sint Maarten or Saint Maarten or St Martin or Saint Martin or Slovak).af. or (Slovenia or Spain or St Kitts or Nevis or Sweden or Switzerland or Taiwan).af. or (Trinidad or Tobago or Turks or Caicos or Uruguay or United Arab Emirates or U S Virgin Islands).af.

24 (United Kingdom or United States or Scotland or Wales or England or United States or (United Kingdom or Andorra or Antigua or Barbuda or Aruba or Australia or Austria or Bahamas) or (Bahrain or Barbados or Belgium or Bermuda or Brunei or Darussalam or Canada) or (Cayman Islands or Channel Islands or Chile or Croatia or Curacao or Cyprus or Czech Republic) or (Denmark or Estonia or Equatorial Guinea or Faeroe Islands or Finland or France)).af.

25 or/23-24

26 (“cardiovascular disease” or “cardiovascular diseases”).mp.

27 exp cardiovascular disorders/

28 coronary heart disease*.mp.

29 (“ischemic” or “coronary artery disease” or “coronary artery diseases” or “heart disease”).mp.

30 (“heart diseases” or “heart attack” or “heart attacks” or “stroke” or “strokes” or “myocardial infarction” or myocardial infarctions or “heart failure” or “cardiovascular disease” or “cardiovascular diseases”).mp.

31 (“cerebrovascular disease” or “cerebrovascular diseases” or “cerebrovascular event” or “cerebrovascular events” or “angina” or “coronary disease” or “coronary artery disease” or “ischemia” or “myocardial ischemic preconditioning”).mp.

32 (“transient ischemic attack” or “brain hypoxia ischemia” or “myocardial ischemia” or “heart diseases” or “myocardial infarction” or “stroke” or “cerebrovascular disorders” or “basal ganglia cerebrovascular disease”).mp.

33 (angina pectoris or cardiomyopathy or heart arrhythmia or irregular heartbeat or congenital heart disease or valvular heart disease or valve heart disease or peripheral artery disease).mp.

34 (thromboembolic disease or congestive heart failure or atherosclerosis).mp.

35 or/26-34

36 exp “costs and cost analysis”/

37 (cost or costs or cost benefit analys* or health care cost).mp.

38 36 or 37

39 (201807* or 201808* or 201809* or 201810* or 201811* or 201812* or 2019*).up.

40 8 and 21 and 22 and 25 and 38 and 39

41 7 and 21 and 22 and 35 and 38 and 39

42 40 or 41 0

Database: Medline (OVID)

Date Searched : 6/4/2019

Results: 9

Search Strategy:

1 (“Hypertension” or “Blood Pressure” or “Hypercholesterolemia”).mp.

2 (“Hypercholesterolemia” or “high blood pressure” or “high cholesterol” or “high level lipid” or “high lipid level” or “high lipid levels” or “high level lipids” or hyperlipidemias or “blood fat” or “blood fats” or “blood lipid” or “blood lipids” or “lower blood pressure lowered blood pressure” or “lower cholesterol” or “lowered cholesterol” or “lowering cholesterol” or “lower lipid” or “lower lipids”).mp.

3 (“lowered lipid” or “lowered lipids” or “lowering lipid” or “lowering lipids” or “Antihypertensive Agents” or “Anticholesteremic Agents” or hypercholesterol* or hyperlipid* or “high cholesterol” or “hmg coa statins” or hyperlipidemia or hyperlipidemia or lipids or cholesterol).mp.

4 (“statins” or “statin” or Hydroxymethylglutaryl-CoA Reductase Inhibitors).mp.

5 (cardiovascular disease risk or heart disease risk or cardiovascular risk or heart attack risk or stroke risk).mp.

6 or/1-5

7 (Pharmacist* or pharmacy services or pharmaceutical care or pharmacy care).mp.

8 6 and 7

9 (Adherence or nonadherence or compliance or dropout* or drop out* or dropped out).mp.

10 (persistence or medication reconciliation or discontinue* or discontinuing or medication possession).mp.

11 (Medication Adherence or compliant or treatment refusal or noncompliant* or non-compliant* or Patient Compliance).mp.

12 (medication therapy management or patient education or reminder* or remind or reminds or reminded or reminding).mp.

13 (improve* or improving or adherent or advocating or advocate* or persistent or increase* or increasing or manage or managed or management or collaborate*).mp.

14 (collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing).mp.

15 (control or controls or controlled or controlling or monitor or monitors or monitored or monitoring).mp.

16 (decrease* or decreasing efficacy* or success*).mp.

17 (support or supportive or supporting or supported or recommend* or centered or Guideline Adherence or Intervention* or strategy or approach or process or policy or policies or encourage* or enforce*).mp.

18 (effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered or discontinue* or discontinuing).mp.

19 (Guideline Adherence or Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or provider education or patient education).mp.

20 (evaluat* or promotion* or preparation*).mp.

21 or/9-11

22 or/12-20

23 (French Polynesia or Germany or Greece or Greenland or Guam or Hong Kong or Iceland or (Ireland or Isle of Man or Israel or Italy or Japan or Korea or Kuwait or Latvia or Liechtenstein) or (Lithuania or Luxembourg or Macao or Malta or Monaco or Netherlands or New Caledonia) or (New Zealand or Northern Mariana Islands or Norway or Oman or Poland or Portugal) or (Puerto Rico or Qatar or Russian Federation or Russia or San Marino or Saudi Arabia)).tw. or (Singapore or Sint Maarten or Saint Maarten or St Martin or Saint Martin or Slovak).af. or (Slovenia or Spain or St Kitts or Nevis or Sweden or Switzerland or Taiwan).af. or (Trinidad or Tobago or Turks or Caicos or Uruguay or United Arab Emirates or U S Virgin Islands).af.

24 (United Kingdom or United States or Scotland or Wales or England or United States or (United Kingdom or Andorra or Antigua or Barbuda or Aruba or Australia or Austria or Bahamas) or (Bahrain or Barbados or Belgium or Bermuda or Brunei or Darussalam or Canada) or (Cayman Islands or Channel Islands or Chile or Croatia or Curacao or Cyprus or Czech Republic) or (Denmark or Estonia or Equatorial Guinea or Faeroe Islands or Finland or France)).af.

25 23 or 24

26 ("cardiovascular disease" or "cardiovascular diseases").mp.

27 exp cardiovascular disease/

28 coronary heart disease*.mp.

29 ("ischemic" or "coronary artery disease" or "coronary artery diseases" or "heart disease").mp.

30 ("heart diseases" or "heart attack" or "heart attacks" or "stroke" or "strokes" or "myocardial infarction" or myocardial infarctions or "heart failure" or "cardiovascular disease" or "cardiovascular diseases").mp.

31 ("cerebrovascular disease" or "cerebrovascular diseases" or "cerebrovascular event" or "cerebrovascular events" or "angina" or "coronary disease" or "coronary artery disease" or "ischemia" or "myocardial ischemic preconditioning").mp.

32 ("transient ischemic attack" or "brain hypoxia ischemia" or "myocardial ischemia" or "heart diseases" or "myocardial infarction" or "stroke" or "cerebrovascular disorders" or "basal ganglia cerebrovascular disease").mp.

33 (angina pectoris or cardiomyopathy or heart arrhythmia or irregular heartbeat or congenital heart disease or valvular heart disease or valve heart disease or peripheral artery disease).mp.

34 (thromboembolic disease or congestive heart failure or atherosclerosis).mp.

35 or/26-34

36 exp "costs and cost analysis"/

37 (cost or costs or cost benefit analys* or health care cost).mp.

38 36 or 37

39 (201807* or 201808* or 201809* or 201810* or 201811* or 201812* or 2019*).dt.

40 8 and 21 and 22 and 25 and 38 and 39

41 7 and 21 and 22 and 35 and 38 and 39

42 limit 40 to english language

43 limit 41 to english language

44 42 or 43 10

Database: Scopus

Date Searched : 6/4/2019

Results: 13

Search Strategy:

#1 TITLE-ABS-KEY ("Hypertension" OR "Blood Pressure" OR "Cholesterol" OR "hypercholesterol*" OR "aspirin" OR "acetylsalicylic acid" or "ASA" OR "high lipid levels" OR "high level lipids" OR "blood fat" OR "blood fats" OR "blood lipid" OR "blood lipids" OR "stroke risk" OR "lower lipid" OR "lower lipids" OR "lowered lipid" OR "lowered lipids" OR "lowering lipid" OR "lowering lipids" OR "Antihypertensive Agents" OR "Anticholesteremic Agents" OR hyperlipid* OR "statins" OR "statin" OR "Hydroxymethylglutaryl-CoA Reductase Inhibitors" or "cardiovascular disease risk" OR "heart disease risk" OR "cardiovascular risk factors" OR "heart attack risk")

#2 TITLE-ABS-KEY ("pharmacist" OR "pharmacists" OR "pharmacy services" OR "pharmaceutical care" OR "pharmacy care")

#3 TITLE-ABS-KEY(adherence OR nonadherence OR compliance OR dropout OR persistence OR "medication reconciliation" OR "medication possession" OR "Medication Adherence" OR "Patient Compliance" OR compliant or adherent OR "treatment refusal" or persistent or dropout* or "drop out" or "dropped out" or discontinue* OR discontinuing)

#4 TITLE-ABS-KEY("medication therapy management" OR reminder OR remind OR reminds OR reminded OR reminding OR improve* OR improving OR advocating OR advocate* OR persistent OR increase* OR increasing OR manage OR managed OR management OR collaborate* OR collaborative OR program OR programs OR programmed OR programming OR intervention* OR strategy OR strategies OR pilot OR reduction OR reduce* OR reducing OR control OR controls OR controlled OR controlling OR monitor OR monitors OR monitored OR monitoring OR decrease* OR decreasing OR efficacy* OR success* OR effect OR effects OR effective* OR counsel* OR support OR supportive OR supporting OR supported OR recommend* OR centered OR "Guideline Adherence" OR Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or "patient education" or "provider education" OR evaluat* or promotion* or preparation*)

#5 TITLE-ABS-KEY (Iceland OR Ireland OR "Isle Of Man" OR Israel OR Italy OR Japan OR Korea OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Netherlands OR "French Polynesia" OR Germany OR Greece OR Greenland OR Guam OR "Hong Kong" OR "United Kingdom" OR Scotland OR Wales OR England OR "United States" OR Andorra OR Antigua OR Barbuda OR Aruba OR Australia OR Austria OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR Brunei OR Darussalam OR Canada OR "Cayman Islands" OR "Channel Islands" OR Chile OR Croatia OR Curacao OR Cyprus OR "Czech Republic" OR Denmark OR Estonia OR "Equatorial Guinea" OR "Faeroe Islands" OR Finland OR France OR Denmark OR Estonia OR "Equatorial Guinea" OR "Faeroe Islands" OR Finland OR France OR "New Caledonia" OR "New Zealand" OR "Northern Mariana Islands" OR Norway OR Oman OR Poland OR Portugal OR "Puerto Rico" OR Qatar OR "Russian Federation" OR Russia OR "San Marino" OR "Saudi Arabia" OR Singapore OR "Sint Maarten" OR "Saint Maarten" OR "St. Martin" OR "Saint Martin" OR "Slovak Republic" OR Slovenia OR Spain OR "St. Kitts" OR "Saint Kitts" OR Nevis OR Sweden OR Switzerland OR Taiwan OR Trinidad OR Tobago OR Turks OR Caicos OR Uruguay OR "United Arab Emirates" OR "U.S. Virgin Islands")

#7 TITLE-ABS-KEY (cost or costs or economic or economics or benefit)

#9 #1AND #2 AND #3 AND #4 AND #6 AND #7 LIMIT-TO (LANGUAGE , "English")

#10 PUBDATETXT ("July 2018" OR "August 2018" OR "September 2018" OR "October 2018" OR " November 2018" OR "December 2018") OR PUBYEAR = 2019

#11 #9 AND #10

#12 TITLE-ABS-KEY("cardiovascular disease" or "coronary heart disease" or "ischemic" or "coronary artery disease" or "heart disease" or "heart attack" or "stroke" or "myocardial infarction" or "heart failure" or "cardiovascular disease" or "cerebrovascular disease" or "cerebrovascular event" or "angina" or "coronary disease" or "coronary artery disease" or "ischemia" OR cardiomyopathy OR "heart arrhythmia" or "irregular heartbeat" OR "congenital heart disease" OR "valvular heart disease" or "valve heart disease" OR "peripheral artery disease" OR "thromboembolic disease" OR "congestive heart failure" OR atherosclerosis)

#17 #2 AND #3 AND #4 AND #6 AND #7 AND #12 LIMIT-TO (LANGUAGE , "English")

#18 #10 AND #17

#19 #11 OR #18

Database: Cochrane (Wiley)

Date Searched : 6/4/2019

Results: 1

Search Strategy:

#1 (pharmacist or pharmacists or "pharmacy services" OR "pharmaceutical care" OR "pharmacy care"):ti,ab,kw

#2 Adherence or nonadherence or compliance or dropout* or persistence or "medication reconciliation" or "medication possession" or compliant or "treatment refusal" or adherent or discontinue* or discontinuing

#3 (medication therapy management or "patient education" or reminder* or remind or reminds or reminded or reminding or improve* or improving or advocating or advocate* or persistent or increase* or increasing or manage or managed or management or collaborate* or collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing or control or controls or controlled or controlling or monitor or monitors or monitored or monitoring or decrease* or decreasing or efficacy* or success* or effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered OR Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or "provider education" or evaluat* or promotion* or preparation):ti,ab

#4 Hypertension OR Blood Pressure OR Cholesterol OR hypercholesterol* OR aspirin OR acetylsalicylic acid OR ASA OR high lipid levels OR high level lipids OR blood fat OR blood fats OR blood lipid OR blood lipids OR stroke risk OR lower lipid OR lower lipids OR lowered lipid OR lowered lipids OR lowering lipid OR lowering lipids OR Antihypertensive Agents OR Anticholesteremic Agents OR hyperlipid* OR statins OR statin OR Hydroxymethylglutaryl-CoA Reductase Inhibitors OR cardiovascular disease risk OR heart disease risk OR cardiovascular risk factors OR heart attack risk OR comprehensive cardiovascular disease risk reduction

#5 "United Kingdom" or "United States" or "Scotland" or "Wales" or "England" or "United States" or "United Kingdom" or Andorra or Antigua or Barbuda or Aruba or Australia or Austria or Bahamas or Bahrain or Barbados or Belgium or Bermuda or Brunei or Darussalam or Canada or "Cayman Islands" or "Channel Islands" or Chile or Croatia or Curacao or Cyprus or "Czech Republic" or Denmark or Estonia or "Equatorial Guinea" or "Faeroe Islands" or Finland or France or "French Polynesia" or Germany or Greece or Greenland or Guam or "Hong Kong" or Iceland or Ireland or "Isle of Man" or Israel or Italy or Japan or Korea or Kuwait or Latvia or Liechtenstein or Lithuania or Luxembourg or Macao or Malta or Monaco or Netherlands or "New Caledonia" or "New Zealand" or

“Northern Mariana Islands” or Norway or Oman or Poland or Portugal or “Puerto Rico” or Qatar or “Russian Federation” or Russia or “San Marino” or “Saudi Arabia” or Singapore or “Sint Maarten” or “Saint Maarten” or “St Martin” or “Saint Martin” or “Slovak Republic” or Slovenia or Spain or “St Kitts” or Nevis or Sweden or Switzerland or Taiwan or “Trinidad” or “Tobago” or Turks or Caicos or Uruguay or “United Arab Emirates” or “U S Virgin Islands”

#6 (cardiovascular disease or cardiovascular diseases or coronary heart disease or coronary heart diseases or ischemic or coronary artery disease or coronary artery diseases or heart disease or heart diseases or heart attack or heart attacks or stroke or strokes or myocardial infarction or myocardial infarctions or heart failure or cerebrovascular disease or cerebrovascular diseases or cerebrovascular event or cerebrovascular events or angina or coronary disease or coronary artery disease or ischemia or ischemic myocardial preconditioning or ischemic attack or hypoxia ischemia or myocardial ischemia or heart diseases or myocardial infarction or stroke or cerebrovascular disorders or basal ganglia cerebrovascular disease or angina pectoris or cardiomyopathy OR heart arrhythmia or irregular heartbeat OR congenital heart disease OR valvular heart disease or valve heart disease OR peripheral artery disease OR thromboembolic disease OR congestive heart failure OR atherosclerosis):ti,ab

#7 cost or costs or economic or economics or benefit

#1 AND #2 AND #3 AND #4 AND #5 AND #7

#8 #1 AND #2 AND #3 AND #5 AND #6

#9 #7 or #8

Limit to English

Database: ERIC (ProQuest)

Date Searched : 5/28/2019

Results: 0

Search Strategy:

1 pharmacist or pharmacists or “pharmacy services” OR “pharmaceutical care” OR “pharmacy care”

2 Adherence or nonadherence or compliance or dropout* or persistence or “medication reconciliation” or “medication possession” or compliant or “treatment refusal” or adherent or persistent or discontinue* or discontinuing or “Medication Adherence” OR “Patient Compliance” or dropout* or “drop out” or “drop outs” or “dropped out”

3 “medication therapy management” or “patient education” or reminder* or remind or reminds or reminded or reminding or improve* or improving or advocating or advocate* or increase* or increasing or manage or managed or management or collaborate* or collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing or control or controls or controlled or controlling or monitor or monitors or monitored or monitoring or decrease* or decreasing or efficacy* or success* or effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered OR “Guideline Adherence” OR Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or “provider education” or “patient education” OR evaluat* or promotion* or preparation*

4 “Hypertension” OR “Blood Pressure” OR “Cholesterol” OR hypercholesterol* OR “aspirin” OR “acetylsalicylic acid” or “ASA” OR “high lipid levels” OR “high level lipids” OR “blood fat” OR “blood fats” OR “blood lipid” OR “blood lipids” OR “stroke risk” OR “lower lipid” OR “lower lipids” OR “lowered lipid” OR “lowered lipids” OR “lowering lipid” OR “lowering lipids” OR “Antihypertensive Agents” OR “Anticholesteremic Agents” OR hyperlipid* OR “statins” OR “statin” OR “Hydroxymethylglutaryl-CoA Reductase Inhibitors” OR “cardiovascular disease risk” OR “heart disease risk” OR “cardiovascular risk factors” OR “heart attack risk”

5 “cardiovascular disease” or “cardiovascular diseases” or “coronary heart disease” or “coronary heart diseases” or “ischemic” or “coronary artery disease” or “coronary artery diseases” or “heart disease” or “heart diseases” or “heart attack” or “heart attacks” or “stroke” or “strokes” or “myocardial infarction” or “myocardial infarctions” or “heart failure” or “cerebrovascular disease” or “cerebrovascular diseases” or “cerebrovascular event” or “cerebrovascular events” or “angina” or “coronary disease” or “coronary artery disease” or “ischemia” or “ischemic preconditioning, myocardial” or “ischemic attack, transient” or “hypoxia ischemia, brain” or “myocardial ischemia” or “heart diseases” or “myocardial infarction” or “stroke” or “cerebrovascular disorders” or “basal ganglia cerebrovascular disease” or “angina pectoris” or cardiomyopathy OR “heart arrhythmia” or “irregular heartbeat” OR “congenital heart disease” OR “valvular heart disease” or “valve heart disease” OR “peripheral artery disease” OR “thromboembolic disease” OR “congestive heart failure” OR atherosclerosis

6 Iceland OR Ireland OR “Isle Of Man” OR Israel OR Italy OR Japan OR Korea OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Netherlands OR “French Polynesia” OR Germany OR Greece OR Greenland OR Guam OR “Hong Kong” OR “United Kingdom” OR Scotland OR Wales OR England OR “United States” OR Andorra OR Antigua OR Barbuda OR Aruba OR Australia OR Austria OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR Brunei OR Darussalam OR Canada OR “Cayman Islands” OR “Channel Islands” OR Chile OR Croatia OR Curacao OR Cyprus OR “Czech Republic” OR Denmark OR Estonia OR “Equatorial Guinea” OR “Faeroe Islands” OR Finland OR France OR Denmark OR Estonia OR “Equatorial Guinea” OR “Faeroe Islands” OR Finland OR France OR “New Caledonia” OR “New Zealand” OR “Northern Mariana Islands” OR Norway OR Oman OR Poland OR Portugal OR “Puerto Rico” OR Qatar OR “Russian Federation” OR Russia OR “San Marino” OR “Saudi Arabia” OR Singapore OR “Saint Maarten” OR “Saint Maarten” OR “St. Martin” OR “Saint Martin” OR “Slovak Republic” OR Slovenia OR Spain OR “St. Kitts” OR “Saint Kitts” OR Nevis OR Sweden OR Switzerland OR Taiwan OR Trinidad OR Tobago OR Turks OR Caicos OR Uruguay OR “United Arab Emirates” OR “U.S. Virgin Islands”

7 cost OR costs OR costly OR economic* OR benefit

8 1 AND 2 AND 3 AND 4 AND 6 AND 7 and dates = 4

8 1 AND 2 AND 3 AND 5 AND 6 AND 7 and dates

9 7 OR 8

Database: CINAHL (EbscoHost)

Date Searched: 5/29/2019

Results: 3

Search Strategy:

Search modes – Boolean/Phrase

Limiters – Language: English

S1 pharmacist or pharmacists or “pharmacy services” OR “pharmaceutical care” OR “pharmacy care”

S2 “Hypertension” OR “Blood Pressure” OR “Cholesterol” OR hypercholesterol* OR “aspirin” OR “acetylsalicylic acid” or “ASA” OR “high lipid levels” OR “high level lipids” OR “blood fat” OR “blood fats” OR “blood lipid” OR “blood lipids” OR “stroke risk” OR “lower lipid” OR “lower lipids” OR “lowered lipid” OR “lowered lipids” OR “lowering lipid” OR “lowering lipids” OR “Antihypertensive Agents” OR “Anticholesteremic Agents” OR hyperlipid* OR “statins” OR “statin” OR “Hydroxymethylglutaryl-CoA Reductase Inhibitors” OR “cardiovascular disease risk” OR “heart disease risk” OR “cardiovascular risk factors” OR “heart attack risk” OR “cardiovascular disease” or “cardiovascular diseases” or “coronary heart disease” or “coronary heart diseases” or “ischemic”

S3 “coronary artery disease” or “coronary artery diseases” or “heart disease” or “heart diseases” or “heart attack” or “heart attacks” or “stroke” or “strokes” or “myocardial infarction” or “myocardial infarctions” or “heart failure” or “cerebrovascular disease” or “cerebrovascular diseases” or “cerebrovascular event” or “cerebrovascular events” or “angina” or “coronary disease” or “coronary artery disease” or “ischemia” or “ischemic preconditioning, myocardial” or “ischemic attack, transient” or “hypoxia ischemia, brain” or “myocardial ischemia” or “heart diseases” or “myocardial infarction” or “stroke” or “cerebrovascular disorders” or “basal ganglia cerebrovascular disease” or “angina pectoris” or cardiomyopathy OR “heart arrhythmia” or “irregular heartbeat” OR “congenital heart disease” OR “valvular heart disease” or “valve heart disease” OR “peripheral artery disease” OR “thromboembolic disease” OR “congestive heart failure” OR atherosclerosis

S4 Adherence or nonadherence or compliance or dropout* or persistence or “medication reconciliation” or “medication possession” or compliant or “treatment refusal or ” OR “Medication Adherence” OR “Patient Compliance” or adherent or discontinue* or discontinuing OR persistent or compliant

S5 “medication therapy management” or “patient education” or reminder* or remind or reminds or reminded or reminding or improve* or improving or advocating or advocate* or increase* or increasing or manage or managed or management or collaborate* or collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing or control or controls or controlled or controlling or monitor or monitors or monitored or monitoring or decrease* or decreasing or efficacy* or success* or effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered or “Guideline Adherence” OR Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or “provider education” or evaluat* or promotion* or preparation*

S6 Iceland OR Ireland OR “Isle Of Man” OR Israel OR Italy OR Japan OR Korea OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Netherlands OR “French Polynesia” OR Germany OR Greece OR Greenland OR Guam OR “Hong Kong” OR “United Kingdom” OR Scotland OR Wales OR England OR “United States” OR Andorra OR Antigua OR Barbuda OR Aruba OR Australia OR Austria OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR Brunei OR Darussalam OR Canada OR “Cayman Islands” OR “Channel Islands” OR Chile OR Croatia OR Curacao OR Cyprus OR “Czech Republic” OR Denmark OR Estonia OR “Equatorial Guinea” OR “Faeroe Islands” OR Finland OR France OR Denmark OR Estonia OR “Equatorial Guinea” OR “Faeroe Islands” OR Finland OR France OR “New Caledonia” OR “New Zealand” OR “Northern Mariana Islands” OR Norway OR Oman OR Poland OR Portugal OR “Puerto Rico” OR Qatar OR “Russian Federation” OR Russia OR “San Marino” OR “Saudi Arabia” OR Singapore OR “Saint Maarten” OR “Saint Maarten” OR “St. Martin” OR “Saint Martin” OR “Slovak Republic” OR Slovenia OR Spain OR “St. Kitts” OR “Saint Kitts” OR Nevis OR Sweden OR Switzerland OR Taiwan OR Trinidad OR Tobago OR Turks OR Caicos OR Uruguay OR “United Arab Emirates” OR “U.S. Virgin Islands”

S7 cost or costs or economic or economics or benefit

S8 S1 AND S2 AND S4 AND S5 AND S6 AND S7 AND
Limiters – Published Date: 20180701-20190531

S9 S1 AND S3 AND S4 AND S5 AND S6 AND S7

Limiters – Published Date: 20180701-20190531

S10 S8 OR S9

Database: Sociological Abstracts (ProQuest)

Date Searched : 5/29/2019

Results: 6

Search Strategy:

1 pharmacist or pharmacists or “pharmacy services” OR “pharmaceutical care” OR “pharmacy care”

2 Adherence or nonadherence or compliance or dropout* or persistence or “medication reconciliation” or “medication possession” or compliant or “treatment refusal” or persistent or discontinue* or discontinuing or dropout* or “drop out” or “drop outs” or “dropped out”

3 “medication therapy management” or “patient education” or reminder* or remind or reminds or reminded or reminding or improve* or improving or adherent or advocating or advocate* or increase* or increasing or manage or managed or management or collaborate* or collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing or control or controls or controlled or controlling or monitor or monitors or monitored or monitoring or decrease* or decreasing or efficacy* or success* or effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered or discontinue* or discontinuing OR “Guideline Adherence” OR “Medication Adherence” OR “Patient Compliance” OR Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or “provider education” or evaluat* or promotion* or preparation*

4 “Hypertension” OR “Blood Pressure” OR “Cholesterol” OR hypercholesterol* OR “aspirin” OR “acetylsalicylic acid” or “ASA” OR “high lipid levels” OR “high level lipids” OR “blood fat” OR “blood fats” OR “blood lipid” OR “blood lipids” OR “stroke risk” OR “lower lipid” OR “lower lipids” OR “lowered lipid” OR “lowered lipids” OR “lowering lipid” OR “lowering lipids” OR “Antihypertensive Agents” OR “Anticholesteremic Agents” OR hyperlipid* OR “statins” OR “statin” OR “Hydroxymethylglutaryl-CoA Reductase Inhibitors” OR “cardiovascular disease risk” OR “heart disease risk” OR “cardiovascular risk factors” OR “heart attack risk”

5 “cardiovascular disease” or “cardiovascular diseases” or “coronary heart disease” or “coronary heart diseases” or “ischemic” or “coronary artery disease” or “coronary artery diseases” or “heart disease” or “heart diseases” or “heart attack” or “heart attacks” or “stroke” or “strokes” or “myocardial infarction” or “myocardial infarctions” or “heart failure” or “cerebrovascular disease” or “cerebrovascular diseases” or “cerebrovascular event” or “cerebrovascular events” or “angina” or “coronary disease” or “coronary artery disease” or “ischemia” or “ischemic preconditioning, myocardial” or “ischemic attack, transient” or “hypoxia ischemia, brain” or “myocardial ischemia” or “heart diseases” or “myocardial infarction” or “stroke” or “cerebrovascular disorders” or “basal ganglia cerebrovascular disease” or “angina pectoris” or cardiomyopathy OR “heart arrhythmia” or “irregular heartbeat” OR “congenital heart disease” OR “valvular heart disease” or “valve heart disease” OR “peripheral artery disease” OR “thromboembolic disease” OR “congestive heart failure” OR atherosclerosis

6 Iceland OR Ireland OR “Isle Of Man” OR Israel OR Italy OR Japan OR Korea OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Netherlands OR “French Polynesia” OR Germany OR Greece OR Greenland OR Guam OR “Hong Kong” OR “United Kingdom” OR Scotland OR Wales OR England OR “United States” OR Andorra OR Antigua OR Barbuda OR Aruba OR Australia OR Austria

OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR Brunei OR Darussalam OR Canada OR
"Cayman Islands" OR "Channel Islands" OR Chile OR Croatia OR Curacao OR Cyprus OR "Czech Republic" OR
Denmark OR Estonia OR "Equatorial Guinea" OR "Faeroe Islands" OR Finland OR France OR Denmark OR Estonia
OR "Equatorial Guinea" OR "Faeroe Islands" OR Finland OR France OR "New Caledonia" OR "New Zealand" OR
"Northern Mariana Islands" OR Norway OR Oman OR Poland OR Portugal OR "Puerto Rico" OR Qatar OR
"Russian Federation" OR Russia OR "San Marino" OR "Saudi Arabia" OR Singapore OR "Sint Maarten" OR "Saint
Maarten" OR "St. Martin" OR "Saint Martin" OR "Slovak Republic" OR Slovenia OR Spain OR "St. Kitts" OR "Saint
Kitts" OR Nevis OR Sweden OR Switzerland OR Taiwan OR Trinidad OR Tobago OR Turks OR Caicos OR Uruguay
OR "United Arab Emirates" OR "U.S. Virgin Islands"

7 cost or costs or costly OR economic* OR benefit

8 1 AND 2 AND 3 AND 4 AND 6 AND 7 AND pd(20180701-20190531)

9 1 AND 2 AND 3 AND 5 AND 6 AND 7 AND pd(20180701 2019-5031)

10 8 OR 9

Database: EconLit (EbscoHost)

Date Searched : 6/4/2019

Results: 18

Search Strategy:

Search modes – Boolean/Phrase

Limiters – Language: English

Requested no date limit

S16 S11 AND S14 AND S15

S15 pharmacy OR pharmacies OR pharmacist OR "pharmaceutical care"

S14 S12 OR S13

S13 "medication therapy management" or "patient education" or reminder* or remind or reminds or reminded
or reminding or improve* or improving or advocating or advocate* or increase* or increasing or manage or
managed or management or collaborate* or collaborative or program or programs or programmed or
programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing or control or
controls or controlled or controlling or monitor or monitors or monitored or monitoring or decrease* or
decreasing or efficacy* or success* or effect or effects or effective* or counsel* or support or supportive or
supporting or supported or recommend* or centered or "Guideline Adherence" OR Intervention* or strategy or
approach or process or policy or policies or encourage* or enforce* or equity or "provider education" or
evaluat* or promotion* or preparation*

S12 Adherence or nonadherence or compliance or dropout* or persistence or "medication reconciliation" or
"medication possession" or compliant or "treatment refusal or " OR "Medication Adherence" OR "Patient
Compliance" or adherent or discontinue* or discontinuing OR persistent or compliant

S11 S9 OR S10

S10 “Hypertension” OR “Blood Pressure” OR “Cholesterol” OR hypercholesterol* OR “aspirin” OR “acetylsalicylic acid” or “ASA” OR “high lipid levels” OR “high level lipids” OR “blood fat” OR “blood fats” OR “blood lipid” OR “blood lipids” OR “stroke risk” OR “lower lipid” OR “lower lipids” OR “lowered lipid” OR “lowered lipids” OR “lowering lipid” OR “lowering lipids” OR “Antihypertensive Agents” OR “Anticholesteremic Agents” OR hyperlipid* OR “statins” OR “statin” OR “Hydroxymethylglutaryl-CoA Reductase Inhibitors” OR “cardiovascular disease risk” OR “heart disease risk” OR “cardiovascular risk factors” OR “heart attack risk” OR “cardiovascular disease” or “cardiovascular diseases” or “coronary heart disease” or “coronary heart diseases” or “ischemic”

S9 “coronary artery disease” or “coronary artery diseases” or “heart disease” or “heart diseases” or “heart attack” or “heart attacks” or “stroke” or “strokes” or “myocardial infarction” or “myocardial infarctions” or “heart failure” or “cerebrovascular disease” or “cerebrovascular diseases” or “cerebrovascular event” or “cerebrovascular events” or “angina” or “coronary disease” or “coronary artery disease” or “ischemia” or “ischemic preconditioning, myocardial” or “ischemic attack, transient” or “hypoxia ischemia, brain” or “myocardial ischemia” or “heart diseases” or “myocardial infarction” or “stroke” or “cerebrovascular disorders” or “basal ganglia cerebrovascular disease” or “angina pectoris” or cardiomyopathy OR “heart arrhythmia” or “irregular heartbeat” OR “congenital heart disease” OR “valvular heart disease” or “valve heart disease” OR “peripheral artery disease” OR “thromboembolic disease” OR “congestive heart failure” OR atherosclerosis

S8 S3 AND S6 AND S7

S7 pharmacy OR pharmacies OR pharmacist OR “pharmaceutical care

S6 S4 OR S5

S5 “medication therapy management” or “patient education” or reminder* or remind or reminds or reminded or reminding or improve* or improving or advocating or advocate* or increase* or increasing or manage or managed or management or collaborate* or collaborative or program or programs or programmed or programming or intervention* or strategy or strategies or pilot or reduction or reduce* or reducing or control or controls or controlled or controlling or monitor or monitors or monitored or monitoring or decrease* or decreasing or efficacy* or success* or effect or effects or effective* or counsel* or support or supportive or supporting or supported or recommend* or centered or “Guideline Adherence” OR Intervention* or strategy or approach or process or policy or policies or encourage* or enforce* or equity or “provider education” or evaluat* or promotion* or preparation*

S4 Adherence or nonadherence or compliance or dropout* or persistence or “medication reconciliation” or “medication possession” or compliant or “treatment refusal or ” OR “Medication Adherence” OR “Patient Compliance” or adherent or discontinue* or discontinuing OR persistent or compliant

S3 S1 OR S2

S2 “Hypertension” OR “Blood Pressure” OR “Cholesterol” OR hypercholesterol* OR “aspirin” OR “acetylsalicylic acid” or “ASA” OR “high lipid levels” OR “high level lipids” OR “blood fat” OR “blood fats” OR “blood lipid” OR “blood lipids” OR “stroke risk” OR “lower lipid” OR “lower lipids” OR “lowered lipid” OR “lowered lipids” OR “lowering lipid” OR “lowering lipids” OR “Antihypertensive Agents” OR “Anticholesteremic Agents” OR hyperlipid* OR “statins” OR “statin” OR “Hydroxymethylglutaryl-CoA Reductase Inhibitors” OR “cardiovascular disease risk” OR “heart disease risk” OR “cardiovascular risk factors” OR “heart attack risk” OR “cardiovascular disease” or “cardiovascular diseases” or “coronary heart disease” or “coronary heart diseases” or “ischemic”

S1 “coronary artery disease” or “coronary artery diseases” or “heart disease” or “heart diseases” or “heart attack” or “heart attacks” or “stroke” or “strokes” or “myocardial infarction” or “myocardial infarctions” or “heart failure” or “cerebrovascular disease” or “cerebrovascular diseases” or “cerebrovascular event” or

“cerebrovascular events” or “angina” or “coronary disease” or “coronary artery disease” or “ischemia” or “ischemic preconditioning, myocardial” or “ischemic attack, transient” or “hypoxia ischemia, brain” or “myocardial ischemia” or “heart diseases” or “myocardial infarction” or “stroke” or “cerebrovascular disorders” or “basal ganglia cerebrovascular disease” or “angina pectoris” or cardiomyopathy OR “heart arrhythmia” or “irregular heartbeat” OR “congenital heart disease” OR “valvular heart disease” or “valve heart disease” OR “peripheral artery disease” OR “thromboembolic disease” OR “congestive heart failure” OR atherosclerosis

Appendix F

Included Studies (Economic Review): Heart Disease and Stroke Prevention: Tailored Pharmacy-based Interventions to Improve Medication Adherence

The number of studies and publications do not always correspond (e.g., a publication may include several studies or one study may be explained in several publications).

Cardiovascular Disease Prevention

Altavela JL, Jones MK, Ritter MJ. A prospective trial of a clinical pharmacy intervention in a primary care practice in a capitated payment system. *J Manag Care Spec Pharm* 2008;14(9):831-43.

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Brophy L, Williams A, Berman EJ, Keleti D, Michael KE, et al. Collaborative DTM reduces hospitalization and healthcare costs in patients with diabetes treated with polypharmacy. *Am J Manag Care* 2014;20(3):e72-81.

Bunting BA, Smith BH, Sutherland SE. The Asheville Project: clinical and economic outcomes of a community-based long-term medication therapy management program for hypertension and dyslipidemia. *J Am Pharm Assoc* 2008;48(1):23-31.

Carter BL, Barnette DJ, Chrischilles E, Mazzotti GJ, Asali ZJ. Evaluation of hypertensive patients after care provided by community pharmacists in a rural setting. *Pharmacotherapy* 1997;17(6):1274-85.

Chan CW, Siu SC, Wong CK, Lee VW. A pharmacist care program: positive impact on cardiac risk in patients with type 2 diabetes. *J Cardiovasc Pharmacol Ther* 2012;17(1):57-64.

Chen JH, Ou HT, Lin TC, Lai EC, Kao YH. Pharmaceutical care of elderly patients with poorly controlled type 2 diabetes mellitus: a randomized controlled trial. *Int J Clin Pharm* 2016;38(1):88-95.

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Connor SE, Snyder ME, Snyder ZJ, Pater Steinmetz K. Provision of clinical pharmacy services in two safety net provider settings. *Pharm Pract (Granada)* 2009;7(2):94-9.

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Cranor CW, Bunting BA, Christensen DB. The Asheville Project: long-term clinical and economic outcomes of a community pharmacy diabetes care program. *J Am Pharm Assoc* 2003;43(2):173-84.

Dehmer SP, Maciosek MV, Trower NK, Asche SE, Bergdall AR, et al. Economic evaluation of the home blood pressure telemonitoring and pharmacist case management to control hypertension (Hyperlink) trial. *J Am Coll Clin Pharm* 2018;1(1):21-30.

Fabel PH, Wagner T, Ziegler B, Fleming PA, Davis RE. A sustainable business model for comprehensive medication management in a patient-centered medical home. *J Am Pharm Assoc* 2019;59(2):285-90.

Fishman PA, Cook AJ, Anderson ML, Ralston JD, Catz SL, et al. Improving BP control through electronic communications: an economic evaluation. *Am. J. Manag. Care* 2013;19(9):709.

Isetts BJ, Brummel AR, De Oliveira DR, Moen DW. Managing drug-related morbidity and mortality in the patient-centered medical home. *Med Care* 2012;50(11):997-1001.

Kraemer DF, Kradjan WA, Bianco TM, Low JA. A randomized study to assess the impact of pharmacist counseling of employer-based health plan beneficiaries with diabetes: the EMPOWER study. *Journal of Pharmacy Practice* 2012;25(2):169-79.

Kulchaitanaroaj P, Brooks JM, Chaiyakunapruk N, Goedken AM, Chrischilles EA, et al. Cost-utility analysis of physician pharmacist collaborative intervention for treating hypertension compared with usual care. *Journal of Hypertension* 2017;35(1):178-87.

Moore JM, Shartle D, Faudskar L, Matlin OS, Brennan TA. Impact of a patient-centered pharmacy program and intervention in a high-risk group. *J Manag Care Pharm* 2013;19(3):228-36.

Pringle JL, Boyer A, Conklin MH, McCullough JW, Aldridge A. The Pennsylvania Project: pharmacist intervention improved medication adherence and reduced health care costs. *Health Aff (Millwood)* 2014;33(8):1444-52.

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Spence MM, Makarem AF, Reyes SL, Rosa LL, Nguyen C, et al. Evaluation of an outpatient pharmacy clinical services program on adherence and clinical outcomes among patients with diabetes and/or coronary artery disease. *J Manag Care Spec Pharm* 2014;20(10):1036-45.

Twigg MJ, Wright D, Barton G, Kirkdale CL, Thornley T. The pharmacy care plan service: evaluation and estimate of cost-effectiveness. *Res Social Adm Pharm* 2019;15(1):84-92.

Vegter S, Oosterhof P, van Boven JF, Stuurman-Bieze AG, Hiddink EG, Postma MJ. Improving adherence to lipid-lowering therapy in a community pharmacy intervention program: a cost-effectiveness analysis. *J Manag Care Spec Pharm* 2014;20(7):722-3.

Wertz D, Hou L, DeVries A, Dupclay L, Jr., McGowan F, Malinowski B, et al. Clinical and economic outcomes of the Cincinnati Pharmacy Coaching Program for diabetes and hypertension. *Manag Care* 2012;21(3):44-54.

Yu J, Shah BM, Ip EJ, Chan J. A Markov model of the cost-effectiveness of pharmacist care for diabetes in prevention of cardiovascular diseases: evidence from Kaiser Permanente Northern California. *J Manag Care Pharm* 2013;19(2):102-14.

Cardiovascular Disease Management

The Community Pharmacy Medicines Management Project Evaluation Team. The MEDMAN study: a randomized controlled trial of community pharmacy-led medicines management for patients with coronary heart disease. *Family Practice* 2007;24(2):189-200.

Delate T, Olson KL, Rasmussen J, et al. Reduced health care expenditures after enrollment in a collaborative cardiac care service. *Pharmacotherapy* 2010;30(11):1127-35.

Ditusa L, Luzier AB, Brady PG, Reinhardt RM, Snyder BD. A pharmacy-based approach to cholesterol management. *Am J Manag Care* 2001;7(10):973-9.

Ellis SL, Carter BL, Malone DC, et al. Clinical and economic impact of ambulatory care clinical pharmacists in management of dyslipidemia in older adults: the IMPROVE study. Impact of Managed Pharmaceutical Care on Resource Utilization and Outcomes in Veterans Affairs Medical Centers. *Pharmacotherapy* 2000;20(12):1508-16.

Lopez Cabezas C, Falces Salvador C, Cubi Quadrada D, et al. Randomized clinical trial of a postdischarge pharmaceutical care program vs regular follow-up in patients with heart failure. *Farmacia Hospitalaria* 2006;30(6):328-42.

Murray MD, Young J, Hoke S, et al. Pharmacist intervention to improve medication adherence in heart failure: a randomized trial. *Ann Intern Med* 2007;146(10):714-25.

Polinski JM, Moore JM, Kyrychenko P, et al. An insurer's care transition program emphasizes medication reconciliation, reduces readmissions and costs. *Health Aff (Millwood)* 2016;35(7):1222-9.

Scott A, Tinelli M, Bond C. Costs of a community pharmacist-led medicines management service for patients with coronary heart disease in England: healthcare system and patient perspectives. *PharmacoEconomics* 2007;25(5):397-411.

Tsuyuki RT, Fradette M, Johnson JA, et al. A multicenter disease management program for hospitalized patients with heart failure. *J Card Fail* 2004;10(6):473-80.

Vegter S, Oosterhof P, van Boven JF, Stuurman-Bieze AG, Hiddink EG, Postma MJ. Improving adherence to lipid-lowering therapy in a community pharmacy intervention program: a cost-effectiveness analysis. *J Manag Care Spec Pharm* 2014;20(7):722-3.

Appendix G Summary Evidence Table (Economic Review):

Heart Disease and Stroke Prevention: Tailored Pharmacy-based Interventions to Improve Medication Adherence

This table outlines information from the studies included in the Community Guide economic review of Tailored Pharmacy-based Interventions to Improve Medication Adherence. It details study design and economic analysis, population and intervention characteristics, and economic outcomes considered in this review. Complete references for each study can be found in the Included Studies section of the [review summary](https://www.thecommunityguide.org/findings/cardiovascular-disease-tailored-pharmacy-based-interventions-improve-medication-adherence) [https://www.thecommunityguide.org/findings/cardiovascular-disease-tailored-pharmacy-based-interventions-improve-medication-adherence]

Abbreviations Used in this Document

- Economic outcomes:
 - DALY: disability-adjusted life year
 - QALY: quality-adjusted life year
 - ROI: return on investment
- Effectiveness outcomes:
 - A1c: glycated hemoglobin
 - BMQ: Specific Beliefs about Medicines Questionnaire
 - BP: blood pressure
 - DBP: diastolic blood pressure
 - HDL-C: High density lipoprotein cholesterol
 - LDL-C: Low density lipoprotein cholesterol
 - MARS: Medication Adherence Report Scale
 - MPR: Medication Possession Ratio
 - SBP: systolic blood pressure
- Study design:
 - RCT: randomized controlled trial
- Measurement terms:
 - DiD: difference in difference
 - Pct pt: percentage point
- Other terms:
 - ADA: American Diabetes Association
 - AF: atrial fibrillation
 - CAD: coronary arterial disease
 - CDSS: clinical decision support system
 - CHD: coronary heart disease
 - CHW: community health worker
 - CKD: chronic kidney disease
 - COPD: chronic obstructive pulmonary disease
 - CV: cardiovascular
 - CVD: cardiovascular disease
 - ED: emergency department
 - HCUP: Healthcare Cost and Utilization Project
 - HTN: hypertension
 - MEPS: Medical Expenditure Panel Survey
 - MI: myocardial infarction
 - mmHg: millimeters of mercury
 - MTM: Medication Therapy Management
 - NR: not reported
 - PBM: pharmacy benefit manager
 - PCP: primary care provider
 - PMAP: patient medication assistance program
 - T2DM: type 2 diabetes
 - UKPDS: United Kingdom Prospective Diabetes Study

Notes:

- **Quality** of economic estimates – Studies are assessed to be of good, fair, or limited quality. This valuation is based on two domains: Quality of Capture [https://www.thecommunityguide.org/about/glossary#quality-based-on-capture], and Quality of Measurement [https://www.thecommunityguide.org/about/glossary#quality-based-on-measure].
- **Race/ethnicity** of the study population: The Community Guide only summarizes race/ethnicity for studies conducted in the United States.

Cardiovascular Disease Prevention

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Author (Year): Altavela et al. (2008) Design: Pre post with control Economic Method: Healthcare cost Funding Source: None Monetary Conversions: Index year assumed 2001 in US dollars	Location: Rochester, New York, USA Setting: Primary care clinic Eligibility: Screened for eligibility based on claims and medical records. Must have HF, CAD, T2DM, HTN, COPD, asthma, dyslipidemia, AF, drug reaction, non-compliance, or any ED visit. Those with T2DM with no PCP visit the past 6 months eligible. Must have PCP visit scheduled in following 2 weeks. Sample Size: Intervention 127 Control 216 Characteristics:	One clinical pharmacist in two primary care clinics serving capitated patients with incentive contract to reduce cost and improve care. Pharmacist had access to pharmacy claims for 73% of intervention and 39% of control patients from which adherence notes and note to physician were distilled. Primary activity was notes to PCPs on drug related problems before patient meets PCP. Pharmacist also offered physician education and patient counseling, adherence monitoring, and patient education, as needed. Implication may be	Measured at 12 months No clinical indicators reported Adherence: Intervention group twice as likely to have adherence issues addressed than control. Note intervention 11 times more likely to have cost-effective therapy prescribed indicating cost-containment effort but effect on drug utilization was not large. Data Source: Pharmacist records Measure Type:	Intervention cost: NR	Healthcare cost: Without prescriptions reduced 2190 and with prescriptions reduced 2004 per patient per year Components Included in Healthcare Cost: Inpatient, ED, labs, outpatient, specialty visits, medication Source and Valuation: 1-year pre and 1-year post claims data. Medication data not available at patient level and available only in aggregate. All cause claims. Measure Type: DiD Change in Mean Productivity: NR Quality of Capture: Good	No economic summary measures Limitations: Short duration Selection bias in recruitment through invitation Non-randomized Large differences in baseline between intervention and control patient

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Age 20-50 19.7%, 51-65 46%, 65 or older 34.7%; Females 65%; Medicare 12.3%; Commercial Ins 87.7%; T2DM 24%; With CVD less than 19% Time Horizon: Baseline July 2000 to June 2001. Intervention July 2001 to June 2002. Intervention length 12 months.	that there was probably little direct contact between pharmacist and patient. Pharmacist recorded PCP response to recommendations at 6 and 12 months. Comparison: Usual care	DiD		Quality of Measurement: Fair	
Author (Year): Borenstein et al. (2003) Design: RCT Economic Method: Healthcare Cost only Funding Source: Novartis Pharmaceuticals	Location: Los Angeles, California, USA Setting: Clinical pharmacists in general practice offices Eligibility: Recruited from two general practices affiliated with large community hospital. Age 18 or older with	Study had four clinical pharmacists and 39 physicians from two practices At first visit to clinic run by clinical pharmacist: assess BP; adherence to drugs; side effects; record patient lifestyle and risk habits; counsel regarding diet and lifestyle. Patients discharged from clinic once BP is	Recorded at 3, 6, 9, and 12 months At 12 months Decrease in Systolic BP: Intervention: 22 mm Hg Control: 11 mm Hg Diff 11 mm Hg At 12 months Decrease in Diastolic BP:	Included in healthcare cost. Perspective of capitated medical group also at risk for pharma costs Average Provider Visit Cost Per Patient Per Year: Intervention: 160 Control: 195 (Average visits to Physician: Intervention 3.4	Outpatient visit costs and pharmacy costs are discussed in program costs column Components Included in Healthcare Cost: Outpatient, pharmacist visits, and HTN medication Source and Valuation: Medical records and per unit costs from practice perspective Measure Type:	No summary economic measures Author Conclusions: Authors claim true clinical setting. In capitated environment, reduced physician visits due to pharmacist co-management can save money only if the physician time is used to see more patients. Note: If increase in HTN medication cost is

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Monetary Conversions: Index year assumed 1999 in US dollars	diagnosis for HTN and with uncontrolled BP. Sample Size: Intervention: 98 Control: 99 Characteristics: Mean Age 62.5; Females 63.2%; African American 40.8%; T2DM: 13.2% Dyslipidemia: 56.1%; SBP: 162; DBP: 92; CVD: less than 5% Time Horizon: Intervention length 12 months Recruits identified during 1996-1998	controlled based on two consecutive readings. Pharmacist calls physician with findings and recommendations based on treatment algorithm. Changes based on cost alone not allowed. Follow-up visits every 2-4 weeks at pharmacist discretion Comparison: Usual care	Intervention: 7 mm Hg Control: 8 mm Hg Diff 1 mm Hg Proportion Achieving BP Goals at 12 Months Intervention: 60% Control: 43% Diff: 17 pct pt Adherence: NR Measure Type: DiD	Control 6.6; Average visits to Physician or Pharmacist: Intervention 8.0 Control 6.6) Change in HTN Medications Cost: Per Month Per Patient: Inter: 11.31 Control: 4.25 Diff: 7.06 (Not significant) Components included in intervention cost: Physician and pharmacist time and medication HTN cost Source and Valuation: Medical records and per unit costs from practice perspective	DiD Change in Mean Productivity: NR Quality of Capture: Fair Quality of Measurement: Fair	included (~84 per patient per year), the total healthcare cost would be higher for intervention than control.
Author (Year): Bosmans et al. (2019) Linked to van der Laan et al. [2017, 2018] Design: RCT Economic Method: Cost per QALY	Location: Nationwide, Netherlands Setting: Community pharmacies Eligibility: Patients on hypertensive medications and	CATI trial Two consultations with pharmacist. First meeting identified barriers to adherence based on questionnaire and interview. Based on barriers, tailored information and	Effects measured at baseline, 3, and 9 months intervention versus control Very small differences were found for most effect outcomes	Cost per patient 48 Components Included in Intervention Cost: Pharmacist time Data Source: Trial records and Dutch average wages	Change in Mean Healthcare Cost Intervention Versus Control: Total 915 Primary -88 Home care 26 Secondary 956 Medication 20 Components Included in Healthcare Cost:	Cost per QALY: 59,979 Probability that intervention is cost-effective was: 0.27 if willingness to pay is 0 0.36 if willingness to pay is 20,000

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Funding Source: Royal Dutch Pharmacists Association (KNMP) Monetary Conversions: Index year 2016 in Euros	age 45 to 75 years, and who self-identify as having hypertension. Patients also had to be non-adherent past 6 months based on either questionnaire or dispensing data. Sample Size: Intervention: 85 Control: 86 from 20 community pharmacies. Characteristics: Mean Age 60; Female 52%; Non-western immigrant 5%; Low education 27%; MARS-5 Sum 21.6; Utility 0.83; SBP/DBP 145/88 Time Horizon: Intervention length 9 months Study during 2016	recommendations provided in areas of information, adherence tools, dealing with side effects, practical barriers, and negative beliefs. Written summary provided to each patient with agreed adherence measures. Second meeting 2-3 months later to discuss progress. Pharmacists underwent 1-day training. Comparison: Usual care consisting of usual pharmacy dispensing protocols.	Change in Adherence: MARS-5 Sum 0.23 Change in Beliefs: BMQ -0.21 QALY gained: 0.02 Change in SBP/DBP: -0.3/-2.2 Measure Type: DiD	for community pharmacists Quality of Capture: Fair Quality of Measurement: Good	Inpatient, outpatient, home care, medications Source and Valuation: Questionnaires requesting 3-month recall of utilization to patients at 3, 6, and 9 months. Medications from pharmacy fills. Valued using Dutch standard costs. Change in Mean Productivity Intervention Versus Control: Total -67 Components Included in Productivity: Absenteeism, presenteeism, for paid and unpaid jobs. Valued at Dutch wages. Measure Type: DiD Quality of Capture: Fair Quality of Measurement: Good	Authors conclude the intervention is not cost-effective. Limitations: Unclear why cost per QALY performed when intervention is not effective. Short trial duration. 20% drop-out addressed with multiple imputations. Cut-Off for adherence on MARS-5 (<25) may be too high. Notes: Note the cost in the cost per QALY is driven by secondary healthcare cost (inpatient) for this short trial. Authors note there already are interventions in place to manage chronic disease and adherence improvement may not add much. Quality of Estimate: Limited

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Author (Year): Brophy et al. (2014) Design: Pre post with control Economic Method: Healthcare cost Funding Source: PerformRx and Amerihealth Caritas Monetary Conversions: Index year assumed 2011 in US dollars	Location: Pennsylvania, USA Setting: Central offices of pharmacy benefits manager (PBM) Eligibility: Patients diagnosed with T2DM or taking at least 1 T2DM med with polypharma. Sample Size: Two groups in intervention, Group 1 690, Group 2 264. 2 groups in control, Group 1 600 Group 2 210. Characteristics: <u>Group 1</u> Mean Age 53; Female 65.6%; Minority 63.4% T2DM 100% <u>Group 2</u> Mean 53; Females 70.5%; Minority 48.9% T2DM 100% Time Horizon:	Drug therapy management (DTM) that optimizes drug regimen, reduce adverse effects and increase adherence. Pharmacists reviewed adherence, used CDSS to identify gaps in care and self-monitoring, and prepared prescriber and patient interventions. Simplify regimens, reduce side effects and drug interactions. Suggestions made to prescribers and to patients indirectly through care managers. Care managers provided health education and coaching and counseling. Pharmacists available to care managers to assist in counseling. Pharmacists recorded each intervention and followed up to determine whether	No clinical outcomes reported Adherence: Highest acceptance of pharmacist recommendations were for medication adherence and for self-monitoring. Data Source: Pharmacist records	Intervention cost: NR	Healthcare cost: Reduction in healthcare cost Grp 1 573 per patient per year Grp 2 608 per patient per year Components Included in Healthcare Cost: Inpatient, ED, Medication, outpatient Source and Valuation: All cause claims data Measure Type: DiD Change in Mean Productivity: NR Quality of Capture: Good Quality of Measurement: Good	No economic summary measures Limitations: Short duration

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Baseline Nov 2009-Oct 2010 and Intervention Nov 2010-Oct 2011 and analysis 6 month after intervention. Intervention length 12 months.	recommendations were accepted and the outcomes. Comparison: Usual care				
Author (Year): Bunting et al. (2008) Medication Therapy Management Design: Longitudinal pre-post Method: Intervention plus healthcare cost Funding Source: Novartis through Pharmacist Association for data extraction from claims Monetary Conversions: Index year 2005 in US dollars	Location: Asheville, North Carolina, USA Setting: Community and hospital pharmacies Eligibility: Employees of City of Asheville and Mission Hospitals in self-insured plans (12,000 covered lives), with diagnosed HTN or dyslipidemia. Participation was by invitation. Sample Size: 620 met inclusion criteria for economic analysis and 565 for clinical.	Medication therapy management for hypertension and dyslipidemia. Adherence included. Pharmacists received certified CVD training. Self-care education by professionals. Face to face pharmacist consulting with patients. Participants matched to or chose care-manager (pharmacists), who they met every three months. Sessions usually 30 minutes. Goals based on Seventh Report of the Joint National Committee on Prevention,	BP measured every visit with pharmacist and lipids at least annually. Follow-up below is yearly compared to baseline. Change in SBP/DBP at F/U #: 423 with HTN data. From baseline at 137.3/82.6 1. -8.0/-3.5; 3. -9.8/-4.3; 5. -12.3/-6.7; 7. -11.0/-4.8 Percent with controlled BP increased from 40.2% to 67.4%	Intervention Cost: NR* *Intervention cost included in healthcare cost Components Included in Intervention Cost: NR Data Source: NR	Per Person Per Year Cardiovascular (CV)-Medical Costs: Historical: 1362 Intervention: 734 Difference: -628 Per person per month: -52.42 Per Person CV-Pharma Costs Per Person Per Year: Historical: 287 Intervention: 846 Difference: 559 Per person per month: 45.83 Cost of CV Events: Based on historical and intervention period CV events and mean event costs, events cost was 1,405,614 compared with actual costs of 476,688, a reduction of 928,926 in averted CV costs.	Savings from cost of averted CV events 928,926 Savings in total medical costs exceeded the increase in cost of medications and the program. Author Conclusions: From health plan perspective, sum of medical plus pharma costs probably led to modest reduction in cost per member per year. If averted CV-events are also accounted, there may be substantial savings for the plans. Note: The program participants were not

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Characteristics (All patients): Mean age:50.4; Male:46.4%; Caucasian: 83.7%; T2DM:25.3%; College:33.5%; CV events: less than 8.1%. Time Horizon: Enrollment Jan 2000 – Dec 2005. Major endpoint is 1-year follow-up. 6 year study.	Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7) and Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP-3) shared with patients and monitored. Comparison: None	Change in LDL-C (HDL-C) at F/U #: 424 with dyslipidemia Baseline was 127.2/48.0 1. -15.8 (0.6); 3. -22.6 (0.4); 5. -16.2 (-0.6); 7. -18.9 (-1.4) CV-Events: The number of CV events reduced significantly from 92 to 48 (OR=0.469). Measure Type: Pre to post		Components Included in Healthcare Cost: CV-related health care costs from claims for inpatient, outpatient, ED, pharma. Also includes intervention cost of reimbursement for 18 pharmacists, educators, and also reduced pharma copays for patients, study related laboratory testing. Source and Valuation: Based on 1189 historical patient-years claims and 1286 intervention period claims. Measure Type: DiD Change in Mean Productivity: NR Quality of Capture: Good Quality of Measurement: Fair	selected from high risk with uncontrolled clinical indicators. Limitations: Pre-post design OOP incentive may attract those with health events in historical period
Author (Year): Carter et al. (1997) Design: RCT	Location: Illinois, USA	Pharmacist for intervention patients from the medical center were in in co-	Measured at 6 months Change in SBP/DBP	Intervention cost: NR	Change in healthcare cost: 140 per patient per year	No economic summary measures Limitations: Short duration

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Economic Method: Healthcare cost Funding Source: Illinois General Assembly Monetary Conversions: Index year assumed 1996 in US dollars	Setting: Community pharmacies Eligibility: HTN patients age 18 or older. Intervention patients from medical center with co-located retail pharmacy. Pharmacist determined invited patients to study based on interview. CVD excluded. Sample Size: Intervention 25 Control 26 Characteristics: Mean Age 67; Females 76%; Adherence 95%; SBP/DBP 146/83; HTN 100%; CVD 0%. Time Horizon: Dates not reported. Intervention length 6 months	located retail pharmacy. BP and pulse recorded every month for 6 months. Also noted adverse drug reactions, compliance, with progress notes. Patient education about disease and lifestyle. Urgent changes in therapy communicated directly to physician. Comparison: Usual care	-6.0/-8.0 mm Hg Adherence: NR Data Source: Study records Measure Type: DiD		Components Included in Healthcare Cost: Medications and outpatient. Source and Valuation: Based on 6-month clinic charges. HTN-related. Measure Type: DiD Change in Mean Productivity: NR Quality of Capture: Fair Quality of Measurement: Fair	Only medications and outpatient considered in healthcare cost.
Author (Year): Chan et al. (2012)	Location: Hong Kong, China	Pharmacist met patient for 15-30 minutes before	Measured at baseline, and 9 months,	Intervention cost: Cost per patient over 9 months 64	Healthcare Cost:	5-year probability of CHD reduced 1.64%

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Design: RCT Economic Method: Intervention cost and partial healthcare cost Funding Source: School of Pharmacy, The Chinese University of Hong Kong and the Diabetes Research Fund, Diabetes Hong Kong Monetary Conversions: Index year assumed 2008 in US	Setting: Diabetes clinic in public hospital Eligibility: Diabetes nurses referred to pharmacists. Age 18 and older with DM2, A1c greater than 8%, and at least 5 medications one of which is a hypoglycemic. Those with existing CVD excluded. Sample Size: Interv. 51 Control 54 Baseline Characteristics Mean Age 63.2; Female 41%; SBP/DBP 141/75; BMI 25.2; A1c 9.7%; CHD risk 2.16; Compliance 74%; T2DM 100%. Time Horizon: Study during the May 2008 to March 2009. Intervention	every visit with physician. Included medication history review. Each visit addressed areas of med adherence, knowledge & beliefs, skills, perceived health, and cognitive function. Tailored med adherence, CVD education, and lifestyle modifications provided. Notes made in medical record to physician for drug related problems. Provided color coded pill boxes and drug bags. Medications were for T2DM, BP, lipids, platelets. Comparison: Usual physician care in T2DM clinic without pharmacist services	intervention versus control Mean pharmacist interventions 5, with 33% related to adherence and 30% in lifestyle modification. Compliance (=number of tablets taken/correct number) improved by 20.5 pct pt. CHD risk score reduced 0.11. 5-year probability of CHD reduced 1.63 pct pt Stroke risk reduced 1.37. SBP/DBP reduced by 3.3/2.1 mmHg A1c reduced 1.17 pct pt. LDL reduced 0.33 % meeting ADA goals increased 6.9 pct pt	Components Included in Intervention Cost: Pharmacist time Data Source: Tracked in study Quality of Capture: Fair Quality of Measurement: Good	Not estimated except for predicted savings from MI avoided Productivity: NR	Intervention cost per patient 64 Cost per CHD event avoided 3902 Average cost of MI treatment 8988.7 Savings per patient 5086.3 over 5 years Limitations: Change in healthcare cost not estimated Short term Adherence self-reported Quality of Estimate: Fair

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	length is 9 months Outcomes assessed at 9 months after start		Measure Type: DiD			
Author (Year): Chen et al. (2016) Design: RCT Economic Method: Intervention cost and healthcare cost Funding Source: Department of Health, Taiwan Monetary Conversions: Index year assumed 2011 in New Taiwanese Dollars	Location: Nantou, Taiwan Setting: Hospital-based physicians and pharmacists for T2DM care Eligibility: Patients of Nantou hospital with T2DM and age 65 or older with A1c greater than or equal to 9.0%. Randomized patients referred by nurse case managers to pharmacist care. Sample Size: Intervention: 50 Control: 50 Characteristics: Mean Age 72; Females 50%; SBP/DBP: 135/75;	Hospital participates in the pay for performance program (P4P) for T2DM care of the Ministry of Health. Four other diseases included in P4P. Incentives to providers for increase follow-up visits, self-care education, annual T2DM specific physicals, and lab tests. Team includes physicians, nurses and dieticians. Nurse case managers referred patients to diabetes pharmacist. Pharmacist also trained diabetes educator. Pharmacist care included assessment of	Measured at 6 months In person visits with pharmacist at enrollment and 1.86 times during study. There were 2.48 mean number of phone contacts. A1c: Interv: 9.22 to 8.39% Control: 8.94 to 9.37% DiD: 1.26 pct pt Study reports difference as 0.83% pct pt (assume this is after statistical adjustments). Adherence: Not reported except a note that states, "our patients strictly adhered to their medications...".	Intervention Cost per patient over 6 months: Interv: 1336.9 Control: 132.0 Diff: 1204.90 Components included in intervention cost: Pharmacist time and salary, telephone fees, supplies, education handouts, adherence aids. Source and Valuation: Patient medical records and wage rates and cost of supplies Quality of Capture: Good Quality of Measurement: Good	Change in Payment Points* Interv: -624 Control: -418.75 Diff: 205.25 Diff in cost intervention v control: 188.83 (Ratio New Taiwanese Dollar/payment points = 0.92) Components Included in Healthcare Cost: Outpatient visits, pharmacist intervention cost, inpatient Source and Valuation: Insurance claims. See components for intervention cost. Measure Type: DiD Change in Mean Productivity: NR	Diff in intervention cost: 1204.90 Diff in healthcare cost: -188.83 Net Benefit of Intervention: -1016.07* Hence, the evidence indicates the intervention is cost increasing. A prior preliminary analysis of the P4P program showed inpatient cost was reduced, see Lee et al (2010) . This could offset the net increase in cost found in the short-term study. *Computed by Reviewers Author Conclusion: The authors suggest the P4P intervention for T2DM may be healthcare cost-saving though the estimate is cost-increasing but

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	No High School: 78%; Years with T2DM: 13 years; A1c 9.2%; Charlson Comorbid: 3.22. Time Horizon: Intervention from Aug 2011 to Feb 2012 Intervention length 6 months	adherence, appropriateness of medication, and drug problem resolutions with follow-up. Also evaluated cognition and depression. Provided diabetes education, recommendations to physicians, and referrals to other care providers. Changes to meds confirmed by physicians after pharmacist counseling. Follow-up visits supplemented by monthly phone calls, and home visits if necessary. Comparison: Usual care for T2DM patients at hospital clinics	Measure Type: DiD		Quality of Capture: Fair Quality of Measurement: Good	insignificant in this 6-month study. Limitations: Short duration Quality of Estimate: Fair
Author (Year): Christensen et al. (2007) Design: Pre to post with matched controls Method:	Location: Durham and Orange Counties, North Carolina, USA Setting: 8 community pharmacies and 2	Intervention: SHP employees offered MTM-type service at no cost with pharmacist local to their home address	Percent of patients with PDTPs identified at first or follow-up visit: Drug underuse 70%; More cost-effective drug available	Intervention Cost: Pharmacists compensated at 120 (60 min) for first visit and 60 (30 min) for follow-up	Per Person 6-month Medication Cost to Payer (Out-of-pocket): Intervention -90.10 (34.30) Control 1 -35.40 (54.30) Control 2 -97.3 (-46.10)	No summary measures estimated Limitations: Short duration. Note the 2 clinical pharmacists in the medical offices saw 36% of the patients.

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Partial intervention cost and healthcare cost Funding Source: North Carolina State Employees Health Plan and Institute for Advancement of Community Pharmacy Practice Monetary Conversions: Index year assumed 2004 in US dollars	clinical pharmacists Eligibility: Medication Therapy Management (MTM)-type program offered to North Carolina State Health Plan (SHP) employees. Targeted patients with large number of prescriptions identified from 1000 highest utilizers from medication claim files. Sample Size: Initial intervention group 130. 85 scheduled visits and 80 had follow-up. Characteristics: Mean Age:68; Male:37%; Younger than 65 (65 or older) percent with disease: Diabetes:37% (45%);	Pharmacists underwent 3-hour education and training focusing on documentation and case studies. Two visits allowed, one initial and one follow-up. Services included drug profile review, identification of potential drug therapy problems (PDTPs) and patient concerns, recommendations for therapy changes to physician, and follow-up to determine if problems resolved. Comparison: Two propensity score matched control groups: SHP employees in Wake County, NC and those who did not get MTM intervention. These received usual care of pharmacists.	60%; Suboptimal drug 50%. Percent of patients by pharmacist recommendations: Add drug 40%; Change a drug 50%; Alter administration/adherence/technique 15%. Type of counseling provided: Medication adherence and self-care 60% Self-monitoring device use 15% Therapy change occurred in 50% of patients Measure Type: Post only	Components Included in Intervention Cost: Pharmacist time Source and Valuation: Pharmacist visit encounter forms Quality of Capture: Good Quality of Measurement: Good	Components Included in Healthcare Cost: Medication Source and Valuation: Claims data 6 months before first encounter and 6 months after. Matches found for 67 of 80 patients. Measure Type: DiD Authors conclude there was no difference in medication costs. Change in Mean Productivity: NR Quality of Capture: Limited Quality of Measurement: Fair	Patients who went to clinical pharmacist more likely to receive counseling on drug use such as adherence (100% v 84.2%).

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	HTN 48% (63%); Dyslipidemia 22% (35%); Any CVD 30% (55%) Time Horizon: Pilot program started Aug 2004. Length of intervention analyzed is 6 months.					
Author (Year): Chung et al. (2011) Design: Pre to post with control Economic Method: Intervention cost Funding Source: The School of Pharmacy, The Chinese University of Hong Kong Monetary Conversions: Index year assumed 2006 in US dollars	Location: Hong Kong, China Setting: Outpatient Lipid Clinic in public hospital Eligibility: Patients diagnosed with dyslipidemia and visiting lipid clinic (resistant dyslipidemia). No exclusion based on existing CHD. Sample Size: Intervention: 150 Control: 150 Characteristics: Mean Age 56; Female 45%;	Clinic patients routinely visited every 16 to 26 weeks, with lab works done 2 weeks prior For intervention, patients met with pharmacist 3 times during 24-month study, usually to coincide with dates of routine clinic visit. Pharmacist made drug therapy suggestions to physicians, if necessary. Pharmacist performed patient education and follow-up of lipid profile and assessed Framingham risk	All effects except adherence measured at 24 months intervention versus control LDL-C: -0.49 HDL-C: 0.05 Total Cholesterol: -0.66 Triglycerides: -0.42 Adherence* (Intervention Only) 2.3 pct pt Adherent (Intervention Only) 13.7 pct pt	Within study intervention cost: 114.84 per patient per year Scaled intervention cost to treat all ~5500 dyslipidemia patients per year 52635, at 9.68 per patient per month Components Included in Intervention Cost: Pharmacist time in documentation, educational visits, and follow-up calls Data Source: Trial records and Hong Kong pharmacist average salary	Change in Healthcare Cost: Potential avoidance of 6 million in healthcare cost due to acute myocardial infarctions avoided per year, 770 MIs at cost of 8010 per event. Components Included in Healthcare Cost: All costs for myocardial infarction. Source and Valuation: Based on incremental numbers with LDL-C at goal. *The assumption that risk of MI is zero for those with LDL-C at goal may be problematic. Measure Type: Post only	Extrapolation to cost of MI avoided: Authors compare this to intervention cost of 116 per patient per year Reviewers Calculations: Cost avoided 6,167,700 Intervention scaled cost 638,880 B/C 9.6 Limitations: Not randomized or blinded Specialized lipid clinic Notes: Adherence already high at 77%

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	LDL-C 3.53 mmol/L; HDL-C 1.60mmol/L; CHD-Risk Moderate 9.3%; HTN 50.7%; T2DM 26.7%; Existing CVD <=20%; Mean Adherence 77.5%; Adherent 57%. Time Horizon: Intervention length 24 months Recruitment starting Oct 2005	score. Activities included explaining clinical values to patient, importance of medication and adherence, medication side effects, suggested lifestyle changes, and relationship of lipid profile to CHD risk. Patients provided with educational leaflet on dyslipidemia. Pharmacist phone number provided and pharmacist make check-up phone calls once a month following checklist on well-being, adherence, and drug issues. Patients also provided adherence aids – pill boxes, diaries, reminder calls, and calendars. Comparison: Routine lipid clinic care from physician without pharmacist	*Compliant defined as compliance => 75%. All 7 alterations to drug therapy recommended by pharmacist rejected by physician or patient. Measure Type: DiD except for Adherence	Mean visits with pharmacist in 24 months: 3.34 Mean length of visit: 20 minutes Mean phone calls: 16.3 Mean length of call: 10 minutes Time to document: 3.08 minutes per patient per week Total of documenting and clinical time was 7.04 per patient per week Quality of Capture: Good Quality of Measurement: Good	Productivity NR Quality of Capture: Good Quality of Measurement: Fair	Percent achieving goals LDL-C reduced as CHD risk score increased similar to other trials Quality of Estimate: Fair

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Author (Year): Connor et al. (2009) Design: Pre post Economic Method: Healthcare cost Funding Source: None Monetary Conversions: Index year assumed 2007 in US dollars	Location: Pennsylvania, USA Setting: Community pharmacies Eligibility: Patients referred to pharmacists by nurses and physicians from community health center. No disease focus. Sample Size: Intervention 100 Characteristics: Mean Age 49; Female 33%; Minority 61%; SBP/DBP 137/85 mm Hg; LDL-C 108 mmol/dL; A1c 10.3%; Less than HS 68%; Medicaid 100%; CVD 0%; T2DM 74%; HTN 54%; Dyslipidemia 29% Time Horizon:	Following MTM model from Univ of Pittsburgh School of Pharmacy implemented by 2-day trained pharmacists. Each encounter records including clinical indicators entered into patient medication record. Individualized recs for self-monitoring. Has action plan and remedies for access to meds such as PMAP. Medications reviewed for appropriateness, effectiveness, and access. Drug related problems recorded including noncompliance. Patient education about disease, lifestyle, medication, and self-monitoring. Comparison: None	Measured at 12 months Reduction in SBP/DBP: -2.7/-2.7 Reduction LDL-C: -16 mmol/dL Reduction A1c: -1.2 pct pt Adherence: NR Measure Type: Pre post	Intervention cost NR	Healthcare cost: Reduced 2916 per patient per year Components Included in Healthcare Cost: Reduced out of pocket cost for medications Source and Valuation: Cost of PMAP program. Measured at 12 months. Measure Type: Pre to post Change in Mean Productivity: NR Quality of Capture: Limited Quality of Measurement: Fair	No economic summary measures Limitations: Short duration ROPC for medication cost only based on PMAP program

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Jan 2007 to Jan 2008 Intervention length 12 months					
Author (Year): Cote et al. (2003) Design: Pre post with control Economic Method: Intervention and healthcare cost Funding Source: University of Laval and Department of Health, Quebec Monetary Conversions: Index year assumed 1998 in Canadian dollars	Location: Canada Setting: Community pharmacies Eligibility: Pharmacists opted into study and control groups. Patients with uncontrolled BP flagged at refill visit and offered study participation. Sample Size: Intervention 41 Control 59 Characteristics: Age % less than 65 37% in intervention and 51% in control; Female 65%; Less than HS education 32%; HTN 100%. Time Horizon:	Pharmacists opted into intervention and control. Pharmacist used CDSS to flag uncontrolled BP patients and also identified adherence. Intervention options followed by pharmacist driven by CDSS recommendations. Intervention activities occurred every refill visit. Comparison: Usual care	No clinical outcomes reported Adherence: Adherence not reported.	Cost per patient per year 120 Components included in intervention cost: Pharmacist time for BP readings, instructions, verbal interventions with participants, opinions to physicians, CDSS development cost and service cost. Patient time. Source and Valuation: Study records and local wages Quality of Capture: Good Quality of Measurement: Good	Change in Healthcare Cost: -290.60 per patient per year Components Included in Healthcare Cost: Medications, inpatient, outpatient Source and Valuation: Pharmacist records, claims, and local wage rates Measure Type: DiD Change in Mean Productivity: NR Quality of Capture: Fair Quality of Measurement: Fair	Authors report benefit-cost ratio of 9.6:1.0 However, the estimate is based on an unrealistic scaling up of intervention cost to Quebec province. Limitations: Short duration Unrealistic scaling in author reported cost-benefit Quality of Estimate: Fair

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Recruit Oct 1998 to Dec 1999 Intervention length 9 months					
Author (Year): Cranor et al. (2003) Design: Pre to post Economic Method: Intervention plus healthcare cost Funding Source: None reported Monetary Conversions: Index year 2001 in US dollars	Location: Asheville, North Carolina, USA Setting: Community pharmacies Eligibility: Patients with diabetes from 2 employer groups, City of Asheville and a local hospital, offered intervention as a wellness program. Sample Size: Intervention: 187 for clinical cohort and 157 for economic cohort at baseline Characteristics: Mean Age 47.7; Female 51%; Caucasian 83%; Type 1 diabetes 27%; A1c 7.8%; LDL-C 116	Pharmaceutical Care Services (PCS) of Asheville Project Community pharmacists, reimbursed for services, including setting treatment goals, monitoring goals, diabetes and lipid management education, device training, adherence monitoring and counseling. Also performed physical exam of feet, skin, BP, and weight. Diabetes education center (DEC) with certified diabetes educators available to patients. Patient incentives of home glucose monitors and waiver of co-pays for all diabetes medications and supplies. Pharmacist made referrals to	Cohort considered for economic evaluation had to have at least 1 PCS visit and 6 months pre intervention data on A1c. Self-reported adherence to medications, ADA guidelines for tests and exams. Effects measured versus baseline every 6 months for 5 years. Change in A1c at F/U #: 1. -1.1; 3. -0.9; 5. -0.9; 7. -1.1 Change in % with optimal A1c 1. 24.3; 2. 27.2; 3. 18.2%	Cohort considered for economic evaluation had to have at least 1 PCS visit and 6 months pre intervention data on healthcare cost. Intervention Cost: NR Was not possible to extract PCS-related costs from claims. So, intervention cost included in healthcare cost. Components Included in Intervention Cost: NR Data Source: NR	Change in Mean Healthcare Cost at F/U Year #: 1. -2704; 3. -3908; 5. -6502 Change in Mean Medication Cost at F/U #: 1. 656; 3. 1932; 5. 2188 * 60% of medication cost was related to diabetes Components Included in Healthcare Cost: All cause inpatient, outpatient, ER visits, labs, PCS services, copay waivers, medications. Separate estimates for DEC visits, diabetes supplies, and diabetes medications. Note inclusion of intervention costs. Source and Valuation: All cause medical records and claims	Total healthcare cost (which includes cost of intervention): Cost per patient per year decreased from payer perspective Notes: Unclear where the comparison group was used in any of the analysis. The demonstration program is now a permanent part of the health benefits. Quality of Estimate: Fair

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Time Horizon: Enrollment during 1997-2001 Annual follow-up over 7 years	physician or DEC as necessary. Pharmacists underwent diabetes education training. PCS without strict protocol incorporated into usual pharmacy care. Comparison: None	Change in LDL-C at F/U #: 1. -4.2; 3. -9.3; 5. -3.2 Change in % with optimal LDL-C 1. 2.4; 2. 8.5; 3. 20.9 5. 15.8 Change in HDL-C at F/U #: 1. 1.1; 3. 1.9; 5. 3.3 Change in % with optimal HDL-C 1. 4.0; 3. 10.9; 5. 15.0 Change in Adherence NR Change in self-care: Patients self-reported improvements in diabetes self-care and monitoring Measure Type: Pre to post		Diabetes and all cause prescription claims available Change in Mean Productivity: Increase of 18,000 per year for one employer Components Included in Productivity: Absences due to illness from employer records. Measure Type: Pre to post Quality of Capture: Good Quality of Measurement: Fair	
Author (Year): Dehmer et al. (2018)	Location:	Home Blood Pressure Telemonitoring and	Effect measured at 12 months	Cost per patient over 12 months 1350	All Cause Medical Cost per patient per year:	Cost per Additional Person with Controlled BP

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Linked to Margolis et al. (2013) Design: Modeled based on RCT Method: Cost per health outcome Funding Source: National Heart, Lung, and Blood Institute (NHLBI). Monetary Conversions: Index year assumed 2010 in US dollars	Minneapolis-St. Paul, Minnesota, USA Setting: Community pharmacies Eligibility: HealthPartners enrollees age 21 years or older with 2 or more primary care visits. SBP/DBP > 140/90, uncontrolled. Sample Size: Intervention 148 Control 150 Characteristics: Mean age:63; Male:54%; Caucasian: 86.6%; Diabetic:13%; CKD: 12%; Household income at least \$50K: 67.5%; SBP/DBP: 148/83; CVD: 9.7% Time Horizon: Recruitment March 2009 to April 2011	Pharmacist Care Management to Control Hypertension (Hyperlink) Pharmacist case management with home blood pressure monitoring. Received home blood pressure monitors that record and transmit to secure website (AMC Health, NY, NY). Initial 1-hour patient visit with pharmacists trained in MTM, to establish care and train in use of BP device. Transmit 3 morning and 3 evening readings per week. Phone meeting with pharmacist every 2 weeks during first 6 months, until BP controlled for 6 weeks, after which meet monthly. Phone meet every 2 months during second 6 months. Phone meetings emphasized	after end of intervention. Change in SBP/DBP in Trial: SBP/DBP: -9.7/-5.1 Change in % with BP Control: 18.4 pct pt Measure Type: DiD	Components Included in Intervention Cost: Study explicitly states inclusion of BP monitor, landline and BP readings transmission service. Pharmacist time in patient encounters. The subscriptions service was over 100 per month. Source and Valuation: Study records and pharmacist log of encounters. Quality of Capture: Good Quality of Measurement: Good	-281.40 HTN and CVD- Cause Medical Cost per patient per year Labs HTN increased 15.60 Labs Lipids increased 14.40 HTN Medications 126.00 Lipid Medications - 44.20 CVD Inpatient -497.60 Components Included in Healthcare Cost: Medications, Inpatient, Labs Source and Valuation: Claims data. Primary analysis based on 'all cause' and secondary analysis based on 'HTN- and CVD-related causes'. Measure Type: DiD Change in Mean Productivity: NR Quality of Capture: Fair Quality of Measurement: Fair	7337 Cost per mm Hg SBP 139 Cost per mm Hg SBP 265 Base case is intervention cost only because change in healthcare cost was not significant. Intervention cost plus cost of HTN medications per additional Person with Controlled BP: 7782 Authors conclude team-care with pharmacist case management had no significant impact on short term medical costs. Limitations: Short duration. Small sample Quality of Estimate: Fair

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Intervention length 12 months	lifestyle changes and medication adherence. Drug therapy adjusted as needed. Pharmacist communicated with PCP through electronic medical records. Comparison: Usual care with pharmacist referral possible				
Author (Year): Fabel et al. (2019) Design: Pre to post Economic Method: Intervention cost and healthcare cost Funding Source: University of South Carolina School of Pharmacy Monetary Conversions: Index year assumed 2014 in US dollars	Location: North Charleston, South Carolina, USA Setting: Clinical pharmacist in primary care practice. Eligibility: Patients served by North Charleston location of PPCP Collaboration between University of South Carolina College of Pharmacy and Palmetto Primary Care Physicians (PPCP). PPCP has	Comprehensive Medication Management (CMM) services Clinical pharmacist within an existing primary care team based on the patient-centered medical home model of care. Study objective is to determine business sustainability. Pharmacist reviewed EMR for patients appropriate for his services. Physicians also referred patients to pharmacist.	Measured at 12 months A1c: Reduced 2.5 pct pt from 12.1% to 9.6% LDL-C: Reduced 37 from 162 to 125 SBP/DBP: Reduced 9/10 from 150/94 to 141/84 Adherence: Not reported Source and Valuation: Retrospective chart review	Pharmacist cost per year 135000 Components included in intervention cost: Salary and benefits, computer, drug information resources, professional memberships. Quality of Capture: Good Quality of Measurement: Good	Annual cost avoidance calculated based on types of interventions performed by pharmacist: 1.9 million Components of Cost Avoided: Hospitalization cost of adverse drug reaction. *This is conjecture though authors state the calculations are based on published methods. Further, the focus on inpatient costs likely overestimates the true cost. Revenues from billing for pharmacist services:	No summary economic measures Authors compare the cost of pharmacist services and the direct billing plus physician revenues. Note the pharmacist was absorbed as an employee after the study. PPCP then expanded the model to an additional location and pharmacist. Author Notes: Took 5 months for number of encounters with pharmacist to increase due to inertia in physician referrals. Limitations:

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	agreements with insurance providers to be compensated for collaborative care of T2DM, billing for MTM and "incident to physician E/M codes". Study location of PPCP had 5 physicians, and 2 nurse practitioners serving 20,000 patients. Agreement with Pharmacy school embedded DPharm pharmacist into the clinic team for 1 year and employed by clinic. Clinic provided necessary equipment, supplies, and private counseling space, access to EMR. Sample Size: Intervention: NR Characteristics:	Pharmacist reviewed patient medical history related to medications and outcomes. Manage regimens within treatment guidelines. Provide counseling on medications, nutrition, life-style, and self-management, and adherence. Limited physical exams. Order diagnostic tests and devices to support medication treatment. Comparison: None	Measure Type: Pre to post		Daily pharmacist-patient encounters (direct billed revenue) ranged from 6.4 (1025) in early months to 11.2 (7398) in later months. Note authors consider daily encounters at full capacity to be 16. Reimbursed cost of pharmacist was calculated to be 65% of pharmacist program cost. Average increase in annual revenue per physician after employment of pharmacist: 14,554 Measure Type: Pre to post Change in Mean Productivity: NR Quality of Capture: Limited Quality of Measurement: Fair	No control Cost versus revenue analysis

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	36% of clinic patients were 65 or older Time Horizon: Intervention length is 12 months. Period from October 2013 through September 2014.					
Author (Year): Fishman et al. (2013) Linked to Green et al. (2008) Design: Based on RCT Economic Method: Program cost and cost-effectiveness. Funding Source: National Heart Lung and Blood Institute grant. Monetary Conversions: Index year assumed 2009 in US dollars.	Location: Western Washington, USA. Setting: 10 primary care medical centers of Group Health Cooperative. Eligibility: Age 25 to 75 years with hypertension and taking medicines. Exclude DM, CVD, and serious conditions. DBP between 90 and 109 mmHg and SBP between 140 and 199 mmHg. Sample Size: BPM 259 BPM+ 261 Usual 258	Electronic Communications and Home Blood Pressure Monitoring to Improve Blood Pressure Control (e-BP). 3-arm trial. All members of group health have EMR integrated into patient website. Home BP Monitoring (BPM) – Usual care plus home BP device, training on use of device and usual website tools to work with physician to control BP measured by device.	Main outcomes were change in SBP/DBP and percentage patients achieving SBP/DBP <140/90 mmHg at 12 months. Percent with BP control: BPM+ 56%; BPM 36%; Usual 31%. Reductions in BP: <u>BPM+ vs BPM</u> SBP 6.0 mmHg less DBP 2.6 mmHg less <u>BPM+ vs Usual</u> SBP 8.9 mmHg less	All materials and labor valued except for the EMR system. Source is project reports. Usual Care: Identifying eligible, informational literature, informing regarding BP. BPM: Usual plus sessions (1 hour) to train on device and web tools, cost of BP device. BP records entered on website. Website handled BP reports to physician by interface. BPM+: Cost of BPM plus time of pharmacist in training and patient and physician contact. 3 pharmacists equally	Healthcare cost from study records: Statement that there was no significant difference in inpatient, outpatient, ED. Except higher specialist visits for pharmacist arm. Productivity gains: NR Measure Type: DiD Quality of Capture: Good Quality of Measurement: Good	Summary Measure: Life years gained modeled based on literature BP control produces 3.4 to 6.2 years for men and 1.6 to 4.5 years for women. Discounted Life Years Gained (Men/Women) Usual 0.31 (0.25) BPM 0.35 (0.29) BPM+ 0.53 (0.44) Cost per Life Year Gained: <u>BPM vs Usual</u> was dominated – not significantly effective <u>BPM+ vs BPM</u> Men 1850 Women 2220 Cost per Systolic mmHG:

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Characteristics: BPM Arm Age 25 to 54 29.3%; Age 55 to 64 41.3%; Age 65 to 75 29.3%; Females 45.9%; Caucasian 86.1%; Less than High School 7.3%; SBP 152.2 mmHg; DBP 89.0 mmHg. BPM+ Arm Age 25 to 54 27.6%; Age 55 to 64 43.7%; Age 65 to 75 28.7%; Females 55.9%; Caucasian 79.3%; Less than High School 8.0%; SBP 152.2 mmHg; DBP 88.9 mmHg. Time Horizon: Intervention length is 12 months.	Home BP Monitoring Plus Pharmacist Care (BPM+) All features of BPM and care supervision by clinical pharmacist trained in BP. Stepped medication following JNC-7. Patient-centered behavioral counseling for medication adherence and lifestyle. Pharmacist detailed initial patient plan and follow-up including drug changes and stepped protocol. Plan sent to patient and physician for input. Clinical decisions made by physician. Communications among three occurred over the web. Patient reported readings and progress toward goals. Omron Hem-705-CP BP device.	DBP 3.6 mmHg less BPM vs Usual SBP 2.6 mmHg less DBP No difference # Secure Messages BPM+ 22.3; BPM 3.3; Usual 2.4. # Phone Encounters BPM+ 7.5; BPM 3.8; Usual 4.0. No significant difference in inpatient, outpatient, ER. Modest but significantly less specialist visits for BPM+ relative to others. Increased life years gained modeled based on BP control. Measure Type: DiD for blood pressure.	shared the panel (87 each). Pharmacist time based on logs was 4 hours per week in patient care and 2 hours per month in consultation with senior pharmacist. Cost per Patient for Usual, BPM, BPM+ Screening and produce self-management materials 3.40, 5.62, 4.76 Patient training 6.17, 25.00, 25.00 Protocol and training for pharmacists 0, 0, 15.33 Pharmacist services 0, 0, 310.63 Home BP monitor 0, 35.00, 35.00 Overhead/fixed costs 0.99, 1.74, 9.65 Total 10.56, 67.36, 400.36 Quality of Capture: Good Quality of Measurement: Good		<u>BPM vs Usual</u> 23.76 <u>BPM+ vs BPM</u> 65.29 Cost per Diastolic mmHG <u>BPM vs Usual</u> was dominated – not significant <u>BPM+ vs BPM</u> 114.82 Cost per 1 pct pt increase in BP Control: <u>BPM vs Usual</u> was dominated – not significant <u>BPM+ vs BPM</u> 16.65 Author Conclusion: BPM+ appears cost-effective relative to BPM alone based on cost per life year gained. Comment: Cost does not include effect on healthcare because RCT found no difference. Numerator is intervention cost alone. Group health is an integrated system while other organizations may need to bundle providers from different systems. Trial involved mostly white patients with web

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Trial period June 2005 to December 2007.	Comparison: Usual Care, patients provided wallet card with BP numbers, pamphlet on BP control, medication adherence and lifestyle info to control BP, website with EMR/Lab access, appointments/refills, secure messaging with physician. Those with uncontrolled BP encouraged to talk to physician.				access. No patient costs considered. Quality of Estimate: Good
Author (Year): Isetts et al. (2012) Design: Pre post with control Economic Method: Healthcare cost Funding Source: Allina Health Systems Innovation and University of Minnesota Monetary Conversions:	Location: Minneapolis-St. Paul, Minnesota, USA Setting: Primary care clinics Eligibility: Patients in pilot CMI clinics with chronic diseases. Focus of effectiveness is diabetes. Sample Size: Interv: CMI implemented in 4	Pilot Care Model Innovation (CMI) Shared savings contract with payer. Medication Therapy Management with team-based patient-centered approach to medication use to help patients achieve desired treatment goals and resolve drug related problems impeding progress to goals. Collaboration between Fairview	For CMI patients receiving MTM services: Mean of 2.13 MTM encounters 4135 drug therapy problems resolved composed of: Adherence 20%; Unnecessary drug 5%; Additional or different drug 28.5%; Dose change 38%;	Intervention Cost: NR *Intervention cost likely included in healthcare cost estimates because the intervention is team-based care with substantial labor component.	Change in Median per Month per Member Cost from Dec 2008 to March 2010 CMI Clinics (341 to 354)3.7% Control (366 to 420) 14.7% Diff -41 Components included in intervention cost: NR. Presumably all components. Source and Valuation: NR Measure Type:	No economic summary measures Author Notes: Favorable cost outcomes and favorable outcomes for cost sharing contracts in the ACO from CMI pilot caused Fairview Health Services to expand CMI to other 38 clinics. Limitations: No details of clinical outcomes

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Index year assumed 2009 in US dollars	clinics. 823 patients had MTM services. Control: 38 clinics Characteristics: Age 15 to 88; Females 60%; Mean number medical conditions 6.4. Most common conditions were HTN, dyslipidemia, and diabetes. Time Horizon: CMI pilot funding began in 2009. Healthcare cost assessed from Dec 2008 through March 2010.	Health Services clinics and University of Minnesota academic health centers. Care teams consist of physicians, nurses, pharmacists, diabetes educators, dietitians, and health coaches. Organized as accountable care organization (ACO) moving away from fee for service to rewards for improved outcomes and quality at reduced cost. Pharmacist contributions: MTM consultations; in-person, telephone, home visits, or co-visits; conferences to discuss patients not at goal; collaborative practice agreements for care of patients with diabetes and other chronic conditions. Comparison:	Drug reaction 8%. Benchmarks for Diabetes Care: Patients meeting 5 performance benchmarks Comparison Group Statewide (5-year period): Increased from 6% to 17.5% CMI Clinic patients 40% in 2009 Data Source: Minnesota Community Measurement Program and pilot program data. Measure Type: Pre to post		Pre to post Change in Mean Productivity: NR Quality of Capture: Fair Quality of Measurement: Good	

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
		Usual care in other system clinics				
Author (Year): Kraemer et al. (2012) Design: RCT Economic Method: Intervention and healthcare cost Funding Source: Community Pharmacy Foundation, Sanofi-Aventis, Lane County Pharmacists Association Monetary Conversions: Index year assumed 2010 in US dollars	Location: Oregon, USA Setting: Community pharmacies. Eligibility: Employees of multiple schools and cities. Pharmacist intervention with ROPC for meds and supplies (for control also) for opted-in beneficiaries of employer plan with T2DM type 1 or 2. Sample Size: Intervention 36 Control 31 Characteristics: Mean Age 56; Female 39%; Caucasian 90%; HTN 72%; T2DM 100%; Dyslipidemia 69%; Commercial insured 100%;	Pharmacist intervention with ROPC for meds and supplies (for control also) for opted-in beneficiaries of employer plan with type 1 or 2 diabetes. Pharmacist underwent 14-hour didactic training. Progress note sent to physicians, but not required. Pharmacist and patient agreed to meet every month first three months and every 1 to 3 months thereafter. Pharmacists counseled patients in private area. Details on activities not provided but outcomes measured included adherence barriers, diabetes knowledge, and satisfaction with care. Comparison:	Measured at 12 months SBP/DBP: -5.9/-1.9 LDL-C: -4 A1c: -0.34 Adherence ASK-20 total barrier score reduced 0.4 Data Source: Study records Measure Type: DiD	Intervention cost per patient per year 225 Components included in intervention cost: Pharmacist time Data Source and Valuation: Pharmacist records Quality of Capture: Good Quality of Measurement: Good	Change in healthcare cost per patient per year: -43 Components Included in Healthcare Cost: All and T2DM related medical (inpatient, outpatient, labs, ED) plus T2DM, HTN, dyslipidemia medications and T2DM supplies. Source and Valuation: Claims from one year baseline pre intervention compared to intervention year, versus control. Measure Type: DiD Change in Mean Productivity: NR Quality of Capture: Good Quality of Measurement: Good	No economic summary measures Limitations: Short duration

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Unemployed 0%; SBP/DBP 136.3/80.6; A1c 7.28%; LDL-C 99.5 mmol/dL; Adherence ASK- 20 score 4.0 Time Horizon: Period of intervention not reported. Intervention length 12 months.	Usual care with both control and intervention receiving ROPC.				
Author (Year): Kulchaitanaroaj et al. (2017) Linked to Carter et al. 2008 and Carter et al. 2009 Design: Markov Cohort Model based on RCTs Economic Method: Cost per QALY gained Funding Source: No external funds Monetary Conversions:	Location: Midwest, USA Setting: Modeled for primary care setting. Eligibility: Patients for cohort model drawn from RCTs. Sample Size: Cohort model based on 399 patients from RCTs Population Characteristics: Mean Age 56.7;	Team-based care co-led by pharmacists and Primary Care Providers (PCPs) located in same clinics. Pharmacist provided recommendations to PCP to address suboptimal therapy in face to face interactions, phone calls, or written communication. Pharmacist counseled patients on medication and lifestyle.	Effects from RCTs: Authors note success of trial including BP reduction, was due to initiation or dosage change for hypertensive medications. Main modeled RCT Outcome: SBP reduction at 6 months: 6.8 for control and 18.8 for intervention Reduction is maintained	Incremental cost per patient 329.15 (from RCT, Kulchaitanaroaj 2012) Separate intervention cost not provided in the model. Components Included in Intervention Cost: Pharmacist time, PCP time, specialist time, in collaboration activities, overheads. Data Source: Records from two RCTs	Incremental Modeled lifetime total healthcare plus intervention cost per patient: 3817.54 Components Included in Healthcare Cost: Modeled substantially cost of CVD events. Inpatient, ED, outpatient, medications, nursing home care, home care. Source and Valuation: Modeled CVD events. HCUP data, Medicare/Medicaid fees, and published studies for unit prices.	Cost per QALY gained Base-case: Lifetime 26,808 5-Year 78547 10-Year 39085 Intervention was cost- effective based on willingness to pay of 50K to 100K 48.6% of the time under multivariable sensitivity analysis. Intervention was cost- effective based on multivariable sensitivity analysis over a lifetime horizon,

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Index year is 2015 in US dollars	With CVD 11.3%; SBP/DBP 151.4/86.9; White 86%; Female 57.4% Time Horizon: Original RCTs were 6 and 9 months. Modeled over lifetime.	Comparison: Usual PCP care	through 24 months and then deteriorates to level for control at 3, 4, and 5 years. Modeled outcomes: Acute coronary syndrome (ACS), heart failure, stroke, death. Model used 6 month cycles over lifetime, 5, and 10 years. Transition and recurrence probabilities based on studies from literature search. QALY QALY increased by 0.14 per patient Utility weights associated with CVD events based on EQ-5D for US communities and MEPS data.	Quality of Capture: Good Quality of Measurement: Good	Measure Type: DiD Productivity: NR Quality of Capture: Good Quality of Measurement: Good	with cost per QALY less than 50K. Sensitivity Analysis: Different profiles of patient cohorts in terms of CVD risks such as BMI and cholesterol. Worst case scenario where SBP reduction maintained only for 24 months. Limitations: Pharmacists and PCPs in RCTs had long history of working together. Notes: Cost per QALY lower for higher risk patients. The present study extends the analysis to long term healthcare cost outcomes from the Kulchaitanaroaj et al. (2012) paper that found pharmacist plus physician team-care costs more than physician alone. Quality of Estimate: Good

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
			Measure Type: DiD			
Author (Year): Moore et al. (2013) Design: Retrospective cohort with matched control. Economic Method: Intervention cost and healthcare cost Funding Source: No external funds. Authors are from CVS Caremark Monetary Conversions: Index year assumed 2009 in US dollars	Location: National, USA Setting: Central office of pharmacy benefit management (PBM) company. Eligibility: Patients from a large employer health plan. High risk patients sent letter invite. Age over 18 with 14 or more claims in past 120 days or with absence of claims for indicated treatment of T2DM, asthma, heart failure or heart disease. Study included patients with T2DM, HTN, dyslipidemia, depression, and asthma. Sample Size: Intervention: 2250	Patients reached by phone from central office of PBM company. Staffed by trained clinical pharmacists. Primary aim was medication reconciliation. First meeting reviewed all medications, lab results sent by patient, patient concerns about medication, and each medication was reviewed for issues of safety, effectiveness, indication, and adherence. Individualized care plan produced and sent to PCP or with patient permission. Care plan shared automatically for patients on referral from case or disease managers. Follow-up appointments made as needed, usually	Change in Adherence: HTN Intervention 2.29 Control -2.31 Diff 4.6 Dyslipidemia Intervention 2.10 Control -2.61 Diff 4.71 T2DM Intervention 1.64 Control -0.73 Diff 2.37 Data Source: Measured as medication possession ratio (MPR). Measure Type: DiD	Cost per patient per year (estimated for year 2009) 478 Components Included in Intervention Cost: NR Data Source: NR Quality of Capture: Fair Quality of Measurement: Good	Change in Mean Healthcare Cost per Year: This is study's primary outcome Total Intervention -1304 Control 160 Diff -1464* *Study notes the driver was inpatient Pharmacy Intervention 327 Control -98 Diff 425 Non-Pharmacy Healthcare Cost Intervention -977 Control 62 Diff -1039 Components Included in Healthcare Cost: Inpatient, outpatient, ED, medications Source and Valuation: Claims from medical and pharmacy. Note estimates are for all causes.	Return on Investment (ROI) Study reports ROI=2.0 (=977/478) Reviewers computed ROI=3.06 (1464/478) Limitations: Self-selected into intervention All cause healthcare cost 33% of patients had depression and 19% had asthma but not possible to separate out their effects/outcomes. Notes: Matched control group on ER use was problematic for loss of substantial number of intervention observations. Analysis comparing outcomes on samples created with and without match on ER visits showed similar results. Quality of Estimate:

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Control: propensity score matched on baseline characteristics from patients not accepting invite (=10126) Even after matching, intervention had larger percentage of patients using mail order for pharma. No difference in adherence measured by MPR. Population Characteristics: Mean Age 74; Female 60%; Pharmacy cost 4853; Mean number of conditions 2.5; HTN MPR 81.8; Dyslipidemia MPR 80.9; T2DM MPR 76. Time Horizon: Full-scale MTM program launched in Aug 2006.	2 or more visits over a year. Comparison: Usual care. Matched control who declined the invitation for MTM services.			Measure Type: DiD Productivity: NR Quality of Capture: Good Quality of Measurement: Good	Fair

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Study during 2009. Data 1 year before and 1 year after study invite is analyzed.					
Author (Year): Pringle et al. (2014) Design: RCT Economic Method: Healthcare cost Funding Source: Community Pharmacy Quality Alliance Monetary Conversions: Index year assumed 2011 in U.S. dollars	Location: Pennsylvania, USA Setting: Community retail pharmacies Eligibility: Age 18 and older in participating health plans and at least 2 medications filled at participating pharmacies for HTN, T2DM, and dyslipidemia. Sample Size: Intervention pharmacies (patients) 107 (29042) Control pharmacies (patients) 111 (30454) Population characteristics: Mean Age 59; Female 57%;	Pennsylvania Project - composed of area partners from commercial, Medicare, and Medicaid health plans, pharmacy chain, information technology, and pharmacy academic department. Composed of a brief screening tool to stratify patients by adherence and a brief 2-5 minute pharmacist-patient meeting in motivational interview format. Meetings can occur with the typical pharmacy encounter such as for refills. Performance assessment measured adherence against payer's benchmarks similar to CMS	Outcomes measured 1 year pre and 1 year post intervention, compared to controls Adherence Change* Calcium channel blockers 6 pct pt Oral T2DM meds 6 pct pt Beta-blockers 6 pct pt Statins 5 pct pt Renin Angiotensin system antagonists 7 pct pt *Based on percent of patients with proportion of days covered at or exceeding benchmark at 80% (PDC80).	No intervention cost provided Study states no additional staff was necessary and intervention was incorporated into usual pharmacist activities.	Measured 12 months pre and 12 months during trial. Median of cost per patient. Calcium channel blockers 21 Oral T2DM meds -341 Beta-blockers -19 Statins -241 Renin Angiotensin system antagonists -91 Components Included in Healthcare Cost*: All health claims *Difference driven by reduction in magnitudes of inpatient and ED visits. Source and Valuation: Claims data. Measure Type: DiD Productivity: NR Quality of Capture: Good	No summary economic measures estimated. Authors conjecture the additional revenues from Medicare star ratings and healthcare cost reduction for health plans afford them opportunity to fund these pharmacy activities. Further, there are increased prescription refills due to improved adherence, which is direct revenue for pharmacy. Limitations: Adherence based on pharma refills but acceptable for health plan level study Duration may be short for healthcare cost components such as inpatient

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Commercial Insured 44%; Medicare/Medicaid 56%; HTN 80%; Dyslipidemia 73%; T2DM 31% Time Horizon: Intervention during 2011 with length 12 months. Analysis based 1 year before and 1 year after.	Medicare Star Rating System. Pharmacists received report comparing to peers and benchmark Selected pharmacy managers received day long training as 'teachers'. Intervention pharmacists taught by teachers at half-day session. Throughout study, teachers visited pharmacies for Q&A. Monthly calls and assessment questions to determine quality of implementation. Comparison: Standard pharmacist interaction during patient encounter	Measured using 2 validated instruments at patient encounter. Final effect estimate based on probit. Measure Type: DiD		Quality of Measurement: Good	
Author (Year): Oliviera et al. (2010) Design: Retrospective multiple years	Location: Minneapolis-St. Paul, Minnesota, USA Setting: Fairview retail pharmacies	In 2005, Minnesota state legislature required medication therapy management (MTM) for those receiving public health coverage.	Measured at every pharmacist visit. Reported in study for first and most recent.	Intervention cost: Cost of MTM per encounter 67 10-year cost of MTM 2,258,302 Sponsors pay for pharmacist visits.	10-year healthcare cost projected based on pharmacist actions to resolve particular drug related problems, based on short term 3-months cost avoidance.	Return on investment ROI= Cost of MTM/Costs avoided =2913850/2258302 =1.29

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Economic Method: Intervention and healthcare cost Funding Source: No external funding Employees of pharmacy Monetary Conversions: Index year assumed 2008 in US dollars	and in primary care clinics Eligibility: Opt-in MTM for Medicaid members with 4 or more meds or treating 2 or more conditions; Members of contracted Part D sponsors or self-insured employers; Fairview employees; private pay patients. Analyzed those in MTM and age 21 or greater. Sample Size: 9068 patients in MTM Characteristics: Age: 21-50 33%, 51-64 33%, 65 or more 44.5%; Females 76%; Number of conditions 9-10 12.5%, 7-8 17.7%, 5-6 19.2%, 3-4 14%, 1-2 11.2%, 0 2.4%;	Study assesses Sept 1998-2008 period of the MTM program in Fairview Pharmacy Services of Fairview Healthcare Services, which predates the legislation. Partnership with U Minnesota with 7 hospitals, 48 GPs, 55 specialty clinics, and 28 retail pharmacies. MTM provided in 17 of 48 Fairview clinics by 6.1 FTE pharmacists. Patient must enroll when invited and attend first visit and every follow-up visit. Initial visit 60 minutes and f/u 30 minutes. Requires private exam/consultation room. Pharmacists assisted by software to assess all conditions and medications; identify drug-related needs; set goals; promote indication, safety,	Drug related problem resolutions are documented All Patients 33,706 MTM encounters for 9068 patients, with mean 3.72 visits. 38,631 drug problems identified and addressed: indication 33.8%; effectiveness 34.9%; safety 14.8%; adherence 16.5%. Within adherence the problems were: affordability 36%, does not understand instructions 24.8%, prefers not to take 15.9%, forgets to take 12.6%, drug not available 8.6%, cannot administer 1.8%. <u>Overall Conditions</u>	Payments based on complexity of visit. Overall MTM practice has pharmacy director, one product manager, one operations manager, and one business operations specialist. Quality assurance by sampling patients from all MTM clinics. Components included in intervention cost: No explicit details provided. Likely substantial part is pharmacist time. Note medication cost is not included. Quality of Capture: Fair Quality of Measurement: Good	Costs avoided: 2,913,850 Components Included in Healthcare Cost: Projected Outpatient, ED visits, Inpatient, and long-term care. Source and Valuation: Projected short term 3-month avoided costs through pharmacist resolution of drug problems. Method validated by external panel of pharmacists and in peer-reviewed paper. Each unit avoided multiplied by unit cost in 2008. Measure Type: Projected by model Change in Mean Productivity: Projected within costs avoided model Quality of Capture: Good Quality of Measurement: Fair	Author Conclusion: Program is indicative of cost savings. Favorable outcomes led to expansion of program. Limitations: Healthcare cost avoided is modeled No control group Opt-in program and possible selection bias. Quality of Estimate: Fair

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Number of drug therapy problems 0 15%, 1 15%, 2 16%, 3 16%, 4 8%, 5 or more 29%. Type of enrollee Medicaid 5.5%, Self-pay 13.6%, Medicare Part D 12.5%, Fairview enrollee 68%. Most common conditions were HTN, hyperlipidemia, diabetes, osteoporosis, esophagitis. Time Horizon: 10-year data from 1998 through 2008. Subset diabetes analysis for Aug 2007 through 2008.	and compliance; document and achieve outcomes; collaborate with other providers. Goals set by pharmacist, patient, and physicians. Comparison: None	Of 4849 patients not at goal at enrollment, 55% improved, 23% unchanged, and 22% worsened. <u>Diabetes Subset*</u> 42.7% reached all 5 goals of A1c, BP, smoking, LDL-C, aspirin compared to 17.3% at baseline. *Subset analysis for 110 patients with diabetes from self-insured employer plan from Aug 2007 to December 2008. Data Source and valuation: Administrative and clinical records. Average cost of visit in 2008 multiplied by mean number of			

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
			visits in 10 years. Measure Type: Pre to post			
Author (Year): Rashed et al. (2010) Design: Retrospective pilot study with comparison (cost only) Economic Method: Intervention cost and healthcare cost Funding Source: The Community Pharmacy Foundation Monetary Conversions: Index year assumed 2006 in US dollars	Location: NR, USA Setting: Community specialty pharmacy Eligibility: Pharmacy contracted with self-funded health plan. Employers sent out invitations for pharmacy care of diabetes. Analyzed those with 3 years data. Sample Size: Intervention: 22 Initial enrollment: 36. Controls with diabetes selected by matching: 46 Characteristics: Mean Age 57; Females 59%; Caucasian 68%;	Pharmacist met with patients in privacy-secured area in multiple pharmacy locations. Initial meeting was 1-hour to evaluate medical history, pharmaceutical profile, and lab values. Also evaluated exercise, food choices, health literacy which were addressed during follow-ups. Modified therapies in collaboration with physicians. Diabetes education provided based on guidelines from American Association of Diabetes Educators, ADA, and American Association of Endocrinologists. Comparison: Selected patients with T2DM receiving usual care	Note clinical data not available for the controls A1c: Reduced 2.21 pct pt from 8.99% to 6.78% LDL-C: Reduced 34.6 from 140.4 to 105.8 HDL-C: Increased 8.0 from 36.8 to 44.8 Triglycerides: Reduced from 63.7 235 to 171.3 CVD Risk Factor Score: Reduced 1.7 from 5.8 to 4.1 Adherence:	No direct estimate of intervention cost provided Cost per patient per year (calculated by reviewers): 348 Components included in intervention cost: Likely cost of pharmacist time. No details provided except statement that the services were a fixed fee per patient per year. Quality of Capture: Good Quality of Measurement: Good	Post only Healthcare cost per patient over 3 years (difference from baseline in year 2004)* 2004 13531 (NA) 2005 8844 (-4687) 2006 10733 (-2798) 2007 11917 (-1614) *Note the cost of medications per patient increased every year from baseline. Reductions were in outpatient and other medical costs, especially inpatient stays and ED visits (data not shown). Cost per patient over 3 years for Control Group: 2004 15505 2005 19109 2006 23455 2007 39831 Change in Healthcare Cost per Patient Compared to Control:	4- year total healthcare cost for intervention versus control: Intervention: 990.615 Control: 2,153,855 Diff: -1,163,240 Author Conclusion: The authors suggest the intervention is healthcare cost-saving. Limitations: No clinical data for controls Small sample Quality of Estimate: Fair

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	African American 32%. Time Horizon: Intervention analyzed for 3-year period from 2005 through 2007.	matched for age, race, and baseline healthcare cost. Used for cost comparison only.	Not shown, but study reports improvement in compliance. Measure Type: Pre to post		Lower outpatient and medical costs for intervention. Higher cost of medications for intervention, especially for diabetes meds and supplies. Components Included in Healthcare Cost: Outpatient, Medication, all other medical Source and Valuation: Payments by health plan Measure Type: Pre to post and DiD Change in Mean Productivity: NR Quality of Capture: Fair Quality of Measurement: Good	
Author (Year): Shireman et al. (2016) Design: RCT Method:	Location: Wisconsin, USA Setting: Community pharmacies Eligibility:	Team Education and Adherence Monitoring (TEAM) Staffed by community pharmacists, pharmacy technicians, with	Effect measured at 6 months after end of intervention Change in SBP/DBP: SBP/DBP: -5.6/-2.2	207 patients had sufficient information for the economic analyses Intervention Cost over 6 months per patient: Staff time 90.06	Per Person 6-month Cost of HTN Medications 85.80 Components Included in Healthcare Cost: HTN Medication	Labor cost of additional patient achieving BP control: 665 Limitations: Short duration Quality of Estimate: Limited

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Intervention cost and partial healthcare cost Funding Source: National Heart, Lung, and Blood Institute (NHLBI) Monetary Conversions: Index year 2007 in US dollars	African American patients age =>18 years taking at least 1 HTN medication and found to have uncontrolled BP using free screening at pharmacy. Patients at 28 Walgreens or Aurora Pharmacy in 5 Wisconsin cities. Pharmacies were randomized. Sample Size: Intervention 276 Control 300 Characteristics: Mean age:54; Male:38%; African American:100%; T2DM:25%; Less than 12 Grade:24%; Household income less than 20K: 45%; SBP/DBP: 151/92; Uncontrolled BP: 100%; Missed => 1 dose last week: 25% Time Horizon:	tools for monitoring and improving medication adherence, with feedback to patients and physicians. Intervention patients got same literature as controls. Invited to baseline and 5 follow-up visits with pharmacist. Tools included Brief Medication Questionnaire (BMQ), screening tools for self-reported barriers to adherence, algorithms to address barriers, checklists to track barriers. Also, structured tool for fax communication with physician. Technicians performed tasks of printing medication records, reminders, recording BP, set up of meeting areas, and recording patient self-reports.	Change in % with BP Control: 17.1 pct pt Change in Adherence: 23.6 Based on proportion of days covered (PDC)=>80% Measure Type: DiD for BP and BP control	Tools and supplies: 14.74 Total: 104.8 Initial visit mean was 24.8 minutes and follow-ups were 11.7 minutes. 84% completed first visit and 59% completed at least 4 follow-ups. 6-month total minutes per patient: Counseling time 60 Communications with PCP: 2.8 Pharmacy technician time: 95 Components Included in Intervention Cost: Staff time, tools, and supplies Source and Valuation: Study and per patient meeting records. Wisconsin wages for personnel time Study provided each pharmacy with counseling station furniture: table, 2 chairs, privacy screen, validated BP monitor and cuffs, appointment book, and supplies.	Source and Valuation: Retrospective analysis of pharmacy claims and fills. Valued using Redbook. Measure Type: Post intervention v control Change in Mean Productivity: NR Other Healthcare Utilization: Note the study found no substantial difference in utilization of inpatient, specialist/PCP visits, ED visits. Quality of Capture: Limited Quality of Measurement: Good	

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Enrollment Dec 2006 – Aug 2007. Intervention length 6 months.	Patient tools included wallet card to record BP, 7-day medication box, leaflets regarding BP and management, and a pedometer. One pharmacist and one technician from each pharmacy received training (1-hour self-study and 7 hour joint workshop). Comparison: Usual care with 14-page guide on HTN, pamphlet on HTN in African Americans, cards to record BP at baseline and F/U.		Total cost. Cost per unit 168? Patient take-home toolkit was 9.62 per unit. Quality of Capture: Good Quality of Measurement: Good		
Author (Year): Spence et al. (2014) Design: Retrospective with matched control Economic Method: ROI and Cost-Benefit	Location: Southern California, USA Setting: Kaiser outpatient pharmacy. Eligibility: Non-adherent patients with T2DM and/or coronary artery	Outpatient Pharmacy Clinical Services (OPSC) of Kaiser Permanente Southern Californian (KPSC). B-SMART (Barriers, Solutions, Motivation, Adherence tools, Relationships, and	Effects measured at 1 year after first refill visit Change in A1c for T2DM Group -0.5 pct pt Change in LDL-C in	OPSC cost to health plan 579,068 Pharmacist training 52,396 Pharmacist time on OPSC 526,672	Change in Healthcare Cost: Count of Hospitalizations: Int 24; Contr 38 (58% reduction) Hospitalization cost avoided 11,367,548	ROI: [(Cost savings from Inpatient and ED Avoided)-(Cost of OPSC and Cost of Medications)]/ (Cost of OPSC and Cost of Medications) =(11640296-579068-1134400)/(579068+1134400) =5.79

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Funding Source: NR Monetary Conversions: Index year assumed 2010 in US dollars	disease (CAD) with A1c and/or LDL-C outside goal. Must be on T2DM/CAD registry. Non-adherent is medication possession ratio (MPR)<0.8. Selection: Patients who received OPSC consultation identified from records, classed as T2DM and for dyslipidemia. Usual care patients selected from med refill records matched to OPSC patients by med class, age, and gender. Sample Size: Intervention: T2DM 359; Dyslipidemia 1121 Control: T2DM 428; Dyslipidemia 1049 Characteristics: For T2DM Mean Age: 56.8	Triage) methodology used by pharmacists in face to face patient encounters at prescription pickup. Process identified barriers, determined workable solutions, motivated patients to adhere, recommended tools, reinforced pharmacist-patient relationship, and triaged patients. Candidate patients identified at point of pharmacy contact using real time medical records, labs, and MPR. Pharmacists underwent 5.5 hours online and in person training. Comparison: Matched patients not receiving OPSC. Presume usual pharmacy care.	Dyslipidemia Group -8.07 Change in % Adherent T2DM 16.1 pct pt Dyslipidemia -1 pct pt Change in MPR T2DM 3 pct pt Dyslipidemia -3 pct pt Measure Type: DiD	OPSC cost when scaled to 40K OPSC-eligible members Components Included in Intervention Cost: Pharmacist time, training Data Source: Patient medical records for encounters and program records for operations cost. Quality of Capture: Good Quality of Measurement: Good	Count of ED visits: Int 78; Cont 85 (8.5% reduction) ED visits cost avoided: 272,749 Total healthcare cost avoided 11,640,296. Increase in Medication Cost 1,134,400. Change in healthcare cost -10,505,896 Components Included in Healthcare Cost: Inpatient, ED, medications Source and Valuation: Counts from claims and valued based on length of stay and per unit cost. Estimated for intervention versus control for both T2DM and Dyslipidemia groups (extrapolated to ~40K OPSC eligible members) Measure Type: DiD Change in Productivity: NR	Authors conclude the intervention has favorable return on investment. Benefit/Cost Ratio: Total Savings in Healthcare Cost/Cost of OPSC =(11640296-1134400)/579068 =18.14 Limitations: Retrospective with matched control. Extrapolation to all eligible in plan from small study. Note: Adherence for dyslipidemia improved less for intervention than control. However, LDL-C improved compared to control. Quality of Estimate: Fair

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Female 47.1% Comorbid Score 1.26; MPR 0.58; A1c 9.79; LDL-C NR For Dyslipidemia Mean Age: 60.1; Female 56.1%; Comorbid Score 1.47; MPR 0.54; A1c NR; LDL-C 135.9 Time Horizon: Selection during March 09 to Dec 2010. Patients followed for 1 year.				Quality of Capture: Fair Quality of Measurement: Good	
Author (Year): Twigg et al. (2018) Design: Pre-post with no control Economic Method: Intervention cost and healthcare cost Funding Source: Community Pharmacy Future (CPF) and Pfizer	Location: Northern England, UK Setting: Community retail pharmacies Eligibility: 50 or more years of age with 1 or more medication, of which 1 must be CVD or DM1 or DM2 related. Referred by GPs	Pharmacy Care Plan (PCP) of Community Pharmacy Future (CPF) Patients asked to meet pharmacist at least at base, 6 months, and 12 months. Subsequent meetings as needed. Activities were medication review, clinical measures recorded,	Measured at base, 6 and 12 months. Completers had mean of 2.93 pharmacist consults. Effects for completers at 12 months: SBP/DBP -2.9/-1.81 %SBP/DBP=>1 40/90 -6.4 pct pt	Cost per patient over 12 months for completers Total 160.67 Training 50.01 Initial consult 33.70 6-month review 15.69 12-month review 12.46 Interim reviews 7.52 Equipment 41.28 Components Included in Intervention Cost:	Change in Mean Healthcare Cost for completers: Total 39.76 Inpatient 60.84 Outpatient 17.68 Practice nurse -4.27 Hospital doctor -34.49 Components Included in Healthcare Cost: Inpatient, outpatient, nurse visits, hospital doctor visits Source and Valuation:	Cost-effectiveness at 12 months: <u>Base Case*</u> Total mean intervention plus healthcare incremental cost 202.91 Mean QALY gained 0.024 Cost per QALY 8495. 97% probability intervention is cost-effective based on 20K NHS threshold.

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Monetary Conversions: Index year 2014-2015 in U.K. pounds	or identified from pharma records. Those with existing CVD excluded. Sample Size: 38 pharmacies. 700 patients at baseline with 378 completing the intervention Statistics for Completers: Mean Age 68; Female 56%; SBP/DBP 139.5/78.4; BMI 30.2; QRisk 24.2; % High QRisk 62.2%; MMAS-8 Low 19.8; MMAS-8 Medium 2.9%; Mean EuroQoL 74.3 Dropouts had higher BMI, lower adherence, lower QoL. Time Horizon: Study during the Feb 2015 to June 2016. Intervention	adherence advice, care plan and goals, referral to GP as needed, referral to smoking, weight loss services etc. Support for intervention by Healthcare Assistant (HCA) taking clinical measurements. Comparison: None	High QRisk 5.4 pct pt* MMAS-8 (Median IQI) 0.26 (0.1, 0.4) Mean EuroQoL 3.15 Mean QALY 0.029 *Mostly due to change in health conditions QoL based on EQ-5D-5L. QALY based on area under curve method. Measure Type: Pre-post	Pharmacist and HCA time with patient Pharmacist and HCA training. Cost of equipment and supplies for clinical measurements and lab tests at pharmacy. Data Source: Tracked in study. Quality of Capture: Good Quality of Measurement: Good	Difference between 12 months pre and 12 months post for <u>patient reported</u> counts. Valued at average cost for NHS. Measure Type: Pre to post Productivity: NR Quality of Capture: Fair Quality of Measurement: Fair	<u>Worst Case*</u> 19,392 54% probability being cost-effective <u>Best Case*</u> 4673 *Base-case analysis based on only patients with all data points. Sensitivity analysis based on best case of excluding cost of equipment and training and worst case of patients with missing values assumed to have zero effectiveness but positive cost Limitations: Pre post. Self-reported adherence, QoL, and healthcare utilization. Quality of Estimate: Fair

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	length is 12 months. Outcomes assessed at 6 and 12 months after start.					
Author (Year): Vegter et al. (2014) Design: Model based on existing program Method: Cost-benefit and Cost per QALY Funding Source: National Heart, One author had grants from the Royal Dutch Pharmaceutical Society (KNMP) during conduct of this study. Monetary Conversions: Index year 2012 in Euros	Location: Netherlands Setting: Community pharmacies Eligibility: 3 Markov models were estimated: patients with no CVD (primary prevention); patients with history or CV and diabetes (secondary prevention); patients with past stroke (secondary prevention after stroke). Sample Size: Markov model cohorts of 10K Characteristics: Mean age:61; Male:55%; No CVD or t2DM 40%;	Medication Monitoring and Optimisation (MeMO) MeMO is an existing program that addresses multiple conditions. The present study focuses on effects on lipid-lowering therapies. Some generic substitutions are mandated and there is discussion about pharmacy care reimbursements. Comparison: Usual care	Efficacy of medications based on large clinical trials for each of the 3 patient groups. Persistence of effects after discontinuation based on various Dutch studies: 61.5% at year 1 and 47.7% for primary and 57.7% for secondary prevention in year 2. Incidence of CV events and stroke from various Dutch observational studies. Non-CV morbidity and mortality from general Dutch population.	Intervention Cost per patient per year: 36.80 within trial (n=418 patients selected for intervention) Cost per patient per year:2.33. Mean of 2.3 minutes of pharmacist time per patient per year for n=6,710 patients on lipid medications Cost of MeMO activities included: Identifying non-adherent patients: 14 minutes per pharmacy per month Evaluation of non-adherent patients: 1-3 minutes per patient Contacts with non-adherent patients and their physicians: mean of 15 minutes Components Included in Intervention Cost:	Initial 5-years of Model Healthcare Cost per Patient for All Patients (Primary and Secondary Prevention): Medication 61 Disease management 53 MeMO intervention 7.70 CV costs -247.70 Components Included in Healthcare Cost: All Source and Valuation: Outpatient visits, labs, medications. Following cardiovascular events were monitored and costs calculated: fatal and non-fatal MI and stroke; revascularizations. Change in Mean Productivity: Not measured within trial. Potential productivity effects estimated from assumptions and	Life time Cost per QALY gained: Primary prevention4585 Secondary Prevention Cost saving All patients Cost saving Probability of cost-effectiveness at20K and50K thresholds for the primary prevention population was 91.7% and 98.1%, respectively. Markov cohorts of 1000. Base case horizon is lifetime and shorter horizons assessed in sensitivity analyses. Costs discounted at 4% and health benefits at 1.5%. Probabilistic sensitivity analysis performed to derive 95% CIs for cost-effectiveness and cost-benefit.

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	CVD or T2DM 60%. Time Horizon: MeMO has been in place since 2006. Modeled cost-effectiveness based on lifetime and shorter horizons.		Adherence: Hazard Ratio of Discontinuation MeMO versus usual care. Primary prevention 0.47 Secondary prevention 0.54 HRQoL measured using utility weights for CV events and large U.K study that used EQ-5D questionnaire. Measure Type: DiD	Pharmacist time. Source and Valuation: Pharmacist time measured for activities for sample of patients. Priced at Dutch wages. Quality of Capture: Good Quality of Measurement: Good	separate analyses performed. Reviewers will not abstract this information. Measure Type: Modeled and DiD Quality of Capture: Fair Quality of Measurement: Good	5-year Intervention Cost Plus Change in Healthcare Cost per Patient for All Patients (Primary and Secondary Prevention): Savings126 Lifetime Intervention Cost plus Change in Healthcare Cost Per Patient Primary Prevention Cost increasing255 Secondary Prevention Savings223 All Patients Savings32 Probabilistic sensitivity analysis indicated probability of cost-savings was 60.7% Disutility weights for CV states and events drawn from Dutch studies. Limitations: No clinical outcomes for any lipids. Improved adherence extrapolated to CV outcomes. Quality of Estimate:

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
						Fair
Author (Year): Wertz et al. (2012) Design: Pre post with control Economic Method: Intervention and healthcare cost Funding Source: Novartis Pharmaceuticals by funding and employment Monetary Conversions: Index year assumed 2008 in US dollars	Location: Cincinnati, Ohio, USA Setting: Community pharmacies Eligibility: Patients age 18 or older with large self-insured plan with at least one CV or T2DM claim. Tracked those in Heart Health Coaching (HC) and those in Diabetes Coaching (DC) Sample Size: Heart Care (HC) 307 and 274 in control Diabetes Care (DC) 307 with 289 in control Characteristics: <u>Heart Care</u> Mean Age 57; Females 58.3%; Caucasian 50.2%;	Partnership among health plan, large employer, and pharmacy Value based insurance design (VBID) with team-based care through medication management for T2DM, HTN, and dyslipidemia. Patients with HTN enrolled in Heart Healthy Coaching (HC) and those with T2DM enrolled in Diabetes Coaching (DC). Tailored pharmaceutical care by community pharmacists. Also financial incentives or reduced co-pay waivers or reductions or contributions to health savings plans. Follow-up visits covered education and monitoring of clinical outcomes	Measured at 12 months Average pharmacist visits 6 for active and 9.5 for retired enrollees <u>HC Group</u> SBP reduced 6.6 mmHg; DBP reduced 4.2 mmHg; % BP Controlled increased 18 pct pt; LDL decreased 6.9; % LDL Controlled increased 13 pct pt <u>DC Group</u> SBP reduced 5.7 mmHg; DBP reduced 4.7 mmHg; % BP Controlled increased 12 pct pt; LDL decreased 7.6; % LDL Controlled increased 11 pct pt.	TBC Cost per Person per Year Heart care 493 Diabetes care 552 Pharma cost increased 41, versus control Components included in intervention cost: No explicit details provided. Appears to be cost of pharmacist time, labs, and cost of providing financial incentives. Quality of Capture: Good Quality of Measurement: Good	Healthcare cost: <u>HC Group</u> HTN Related Per Person per Year Health Care Costs reduced by 269, versus control. All cause reduced 281 <u>DC Group</u> T2DM Related Per Person per Year Health Care Costs increased by 272, versus control. CV related reduced 1107 All cause reduced 633 (All cause due to increase in meds and outpatient in intervention and increase in inpatient in control) Components Included in Healthcare Cost: Outpatient, Medication, ED, Inpatient Source and Valuation: 1-year baseline and 1-year intervention claims data Measure Type: DiD Change in Mean Productivity:	<u>HC Group</u> TBC plus All Cause Healthcare Cost Per Person per Year: 212 <u>DC Group</u> TBC plus All Cause Healthcare Cost Per Person per Year: -81 Author Conclusion: Study observed increase in cost due to increased medication and provider visits but offset by reduction in cardiovascular events. Limitations: Short duration Selection bias in recruitment through invitation Quality of Estimate: Good

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	African American 36.8%; Any CVD 15.3%; HTN: 82.4%; T2DM: 4.2%; SBP/DBP 136.1/79.3; LDL: 104.1 <u>Diabetes Care</u> Mean Age 59; Females 52.1%; Caucasian 51.1%; African American 33.6%; Any CVD 23.5%; HTN: 54%; T2DM; 93.2; SBP/DBP 136.1/81.0; LDL: 91.6; A1c: 7.9 Time Horizon: Rolling enrollment 2008 through 2009. Average intervention length 14 months.	including feet exams for diabetes patients. Also monitored adherence and treatment goals. Comparison: Usual care for matched patients offered program but declined to participate	A1c reduced 0.8; A1c controlled increased 18 pct pt Adherence: Pct Pt increase in medication adherence versus control: HTN: 7.1 in DC and 11 in HC Statins: 11 in DC and 11 in HC Antidiabetic: 8 for HC but no diff for DC. Higher HTN, statin, antidiabetic use for HC and DC groups versus control Data Source: Medical charts from follow up Measure Type: DiD		NR Quality of Capture: Good Quality of Measurement: Good	
Author (Year): Yu et al. (2013) Linked to Ip et al (2013)	Location: Northern California, USA Setting:	16 Kaiser Permanente primary care physicians referred	Effect measured at 12 months Change in A1c:	Intervention Cost: NR No separate intervention cost	10-year healthcare cost: Intervention 35,740 Control 44,528 Diff -8788	Incremental intervention plus healthcare cost -8788

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Design: Pre to post with matched control Method: Modeled cost effectiveness from trial outcomes Funding Source: American Association of Colleges of Pharmacy, New Pharmacy Faculty Research Awards Program Monetary Conversions: Index year 2011 in US dollars	2 Kaiser Clinics. Clinical pharmacist. Eligibility: Referred by Kaiser PCPs to clinical pharmacist for T2DM patients with A1c > 7%. Sample Size: Intervention 204 Control 407 Characteristics: Mean Age: 55.5; Mean T2DM Duration: 6.1 years; T2DM:100%; CHD Risk: 16.4%; SBP/DBP: 128.9/73.9; A1c: 9.5% Total Cholesterol: 179.4; Charlson Comorbidity Index: 7.0 Time Horizon: Intervention length 12 months	T2DM patients to clinical pharmacist. Single pharmacist with PharmD and certificate in diabetes education. Prescribed and adjusted meds, ordered labs, administered immunizations, provided diabetes self-management education, and sought to optimized overall diabetes and CVD care. Pharmacist integrated into the care team. Average length of initial consultation was 45 minutes and 15 minutes for follow-up (usually by phone). Comparison: Cohort model	Intervention 9.5% to 6.9% Control 9.3% to 8.4% Diff -1.7 Odds of Achieving Control: A1c: 3.9; LDL-C: 2.0; BP: 2.0. 10-Year CHD Risk: Intervention 16.4% to 9.3% Control 17.4% to 14.8% Diff -4.5 pct pt Measure Type: DiD Change in Adherence (Assumed from trial) Improved 15 pct pt from baseline of 65% Long term outcomes modeled as CHD and stroke outcomes and impacts on QoL and costs. Probabilities drawn from	provided because it is aggregated into healthcare cost from payer perspective. Components Included in Intervention Cost: Pharmacist and physician wages Source and Valuation: Length and number of consultations based on trial records.	Annualized difference - 879 Components Included in Healthcare Cost: Pharmacist wages, cost of medications, physician wages. Modeled cost of CHD and stroke events plus cost of intervention Source and Valuation: Events generated by model and cost assigned based on per unit cost derived from literature. Measure Type: Modeled Change in Mean Productivity: NR Quality of Capture: Good Quality of Measurement: Good	Incremental QALY Intervention 5.51 Control 5.02 Diff 0.49 Intervention dominates control. Also dominates when upper bound of CHD risk score is used. Methods: Markov cohort model Modeled CHD or stroke events and risk of death from CHD or stroke over 10 year horizon. Discounting at 3%. Sensitivity Analysis: One-way and probabilistic sensitivity analyses performed Largest impact on monetary net benefits was time horizon and utility weight of CVD-free diabetes patients 4-year time horizon appeared to be minimum for positive monetary benefits. Probabilistic sensitivity analysis with threshold at 50K per QALY indicated 5-yearar

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
			UKPDS based on patient characteristics and clinical indicators from trial. QoL weights based on literature or assumptions.			horizon is minimum for cost-effectiveness. Limitations: Based on small number of patients and providers in 2 medical centers. Unclear what aspect, such as adherence, was cause for improvements. Quality of Estimate: Good

Cardiovascular Disease Management

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Author (Year): Delate et al. (2010) Design: Pre post with matched control Economic Method: Intervention and healthcare cost	Location: Denver and Boulder, Colorado, USA Setting: Primary care or hospital Eligibility: Patients with incident coronary arterial disease enrolled within 90 days after incident. Matched control	Comprehensive Cardiac Care Service (CCCS) Team care by clinical pharmacist, nurse, and physician director. CCCS uses shared web-based tracking database to monitor	Effectiveness of CCCS from other studies: LDL below 100 mg/dl 86% HTN below 140/90 70% Deaths in control (intervention): All cause 188 (16) and CAD related 98 (12) Adherence:	Intervention cost per patient per year: 362.50 Components Included in Intervention Cost: Pharmacist and nurse time and overheads	Healthcare cost: Intervention 38 per patient per day and control 108 per patient per day. Adjusted difference was lower in intervention by 59.36 per patient per day. Annualized reduction in healthcare cost was 26,216 per patient.	No economic summary measures Limitations: Selection bias in recruitment through invitation Non-randomized

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Funding Source: Kaiser Permanente Colorado Monetary Conversions: Index year 2007 in US dollars	patients with incident CAD and similar baseline health expenses and chronic disease score. Exclude younger than 18 and older than 80. Sample Size: Intervention 628 Control 628 Characteristics: Mean Age 61.7; Females 33.3%; With CVD 100%; Chronic Disease Score 3.9 Time Horizon: Retrospective analysis of existing program. Expenditure data from 2007. Mean days within analysis were 630 in control and 945 in intervention.	progress and update changes. Post discharge, nurse-managed cardiac rehab including smoking cessation, dietary modifications, exercise, and initiation of secondary prevention drugs (cholesterol and hypertension). After nurse program, patient transferred to pharmacist-led long-term CAD drug therapy management. These are evidence-based drug strategies and performed substantially over phone. Duration is indefinite and frequency depends on control of lipids, HTN, and T2DM. Pharmacists activities included making drug recommendations, implementing and titrating physician approved evidence based changes,	Prescriptions of statins, beta blockers after myocardial infarction, and antiplatelet therapy were 87%, 100%, and 97%, respectively. Data Source: Study records and previous studies of the project Measure Type: DiD	Source and Valuation: Study records and health plan salaries. Based on salary plus benefits of pharmacists and mean patient panel size and overheads per pharmacist. Quality of Capture: Fair Quality of Measurement: Good	Components Included in Healthcare Cost: Outpatient, inpatient, ED, rehab, extended care, medications, labs, radiology. Source and Valuation: Health plan claims for all cause because most patients had multiple comorbidities. Measure Type: DiD Change in Mean Productivity: NR Quality of Capture: Good Quality of Measurement: Fair	

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
		interpreting labs, and monitoring drug adherence on long term basis. Comparison: Matched patients with incident CAD receiving usual care.				
Author (Year): DiTusa et al. (2001) Design: Pre to post with control Economic Method: Healthcare Cost only Funding Source: No funding. Monetary Conversions: Index year assumed 2000 in US dollars	Location: Western New York, USA Setting: Onsite pharmacy in medical center with multiple primary care providers. Eligibility: Patients with documented CVD, including myocardial infarction, cerebral vascular disease, peripheral artery disease, angina, or surgical revascularization. Enrollment occurred at prescription refill for those patients whose PCP agreed to participate. Controls chosen	Pharmacists had group and individual training on National Cholesterol Education Program (NCEP) II, case studies, lifestyle and pharma management strategies, and patient assessment procedures based on EMR. Lipid profile screen and assessment screen developed to monitor and assess. Medication history and demographics collected at first pharmacist meeting. Pharmacist reviewed EMR	Follow-up at 6 months. Less than 1% of recs refused by PCPs. Increase in cholesterol med therapy in intervention was 75% versus 50% for control at follow-up. Percent at goal for LDL in intervention was 45% at baseline and 72% at follow-up, and for controls it was 35% at baseline and 46% at follow-up. No difference for other lipids. There was also no significant difference in CVD events. Adherence NR Measure Type: DiD	Not reported	Cost of cholesterol medications per patient per months for intervention (control) was 46 (44) versus 42 (50) at 1-year follow-up. Components Included in Healthcare Cost: Medication Source and Valuation: Medical records and pharmacy claims. Measure Type: DiD Change in Mean Productivity: NR Quality of Capture: Limited Quality of Measurement: Good	No summary economic measures Limitation: Assessed only cost of cholesterol medications.

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	similarly from non-participants. Sample Size: Intervention: 300 Control: 150 Characteristics: Mean Age 67; Females 30%; HTN: 55%; CVD: 100%; SBP/DBP: 145/82; A1c: 7.3 Time Horizon: Intervention length 6 months Recruits identified during Jan 1999 to June 30 1999.	screen for medical chart, pharma records, lab data, cholesterol profile. Recs made to PCP for lab tests and therapy changes. Also made recs on adherence and adverse events from patient self-report and lab reports. All recs implemented upon PCP approval. Appropriate follow-up determined by pharmacist. Medication counseling covered cholesterol risk for CVD, medication adherence, diet and lifestyle changes, and lab monitoring. Pharmacist referred patient to nutrition classes, dietitian, or diabetes educator as needed. Follow-up visits every 2-4 weeks at pharmacist discretion Comparison:				

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
		Usual care				
Author (Year): Ellis et al. (2000)^a Linked to Ellis et al. (2000)^b Design: RCT Economic Method: Healthcare cost plus intervention cost Funding Source: Pharmacia & Upjohn; American College of Clinical Pharmacy-Merck Pharmacoeconomics Fellowship Awards Monetary Conversions: Index year assumed 1998 in US dollars.	Location: 9 locations in USA Setting: Pharmacist-managed clinics or primary care clinics in Veterans Affairs Medical Centers (VAMC) Eligibility: Patients with 3 or more of: 5 or more drugs; 12 or more doses daily; 3 or more drug changes past year; non-compliance; drugs requiring monitoring. Not seen in pharmacist managed clinic past year. 72% (n=150) of intervention and 70% (n=161) required secondary prevention. Remaining inter (control) of 58 (68) were primary prevention. Sample Size: Intervention: 208 Control: 229	IMPROVE (Impact of Managed Pharmaceutical Care on Resource Utilization and Outcomes in Veterans Affairs Medical Centers) Staffed by clinical pharmacists. Original trial had multiple disease foci. Study focused on LDL-C goals for substantial patient pool with existing CHD. Initial visit with pharmacist for drug assessment, followed by adjustments in regimen and identification and resolution of drug-related problems. Continue with monitoring and follow patients until patient, PCP, pharmacist agreed goal of therapy achieved. Mix of VAMC sites whether they	Follow-up at 12 months. Pharmacist visits at baseline for intervention (control) was 192 (160) and after 12 months was 629 (177). Intervention also had 140 phone contacts. Medication-related #problems (%resolved): drug education (996 (93.6%); Not taking drug as prescribed 436 (55%) out of 3048 total. LDL reduced 10.6. No difference in percent controlled. Measure Type: DiD	Included in healthcare cost estimate Components Included in Intervention Cost: Pharmacist time Data Source: Local Veterans Affairs Department data	Change in Mean Healthcare Cost Intervention Versus Control: 370 increase Components Included in Healthcare Cost: Pharmacist time, medications, inpatient, outpatient, labs. All cause. Source and Valuation: Single Veterans Administration Medical Center and Medicare. Measure Type: DiD Change in Productivity: NR Quality of Capture: Good Quality of Measurement: Good	No summary economic outcomes. Limitations: Nine locations but cost per unit drawn from single VAMC in Denver.

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Characteristics: Mean Age 65; Female 4%; CVD 67%; T2DM 36%; Dyslipidemia 100%; HTN 76%; LDL 129.4 Time Horizon: Intervention length 12 months Analysis period 1997-1999	allowed pharmacist regimen modification or lab tests orders. By protocol 3 visits required: baseline, 6 months, 12 months. Comparison: Usual care consisting of usual at VAMC.				
Author (Year): Lopez-Cabezas et al. (2006) Design: RCT Economic Method: Intervention cost and healthcare cost Funding Source: Health Research Fund (Fondo de Investigacion Sanitaria, FIS) and European Regional Development Fund (ERDF)	Location: Badalona, Spain Setting: Pharmacies in 2 hospitals Eligibility: Patients with heart failure recruited from 2 hospitals at discharge. Sample Size: Intervention 70 Control 64 Characteristics: Mean Age 76.1; Female 53.1%; T2DM 37.5%;	Hospital pharmacists from research team, likely clinical pharmacists. Pharmacist interview with patient and caregiver at day of hospital discharge dealing with: disease info supported with audiovisual and written materials; diet education on foods to avoid/reduce; drug therapy and need to follow prescriptions.	Follow-up at 12 months. Percent readmission with heart failure or other cause was Control (Interv) = 72% (39%) and days of stay 611 (410) or mean days 9.6 (5.9). Deaths percentage at 12 months control (interv) was 29.7% (12.9%) EuroQoL and patient satisfaction with care on 0-10 scale. At 12 months control (interv) was 60.6 (64.0)	Intervention cost: 31 euros per patient per year Components included in intervention cost: Patient education materials, pharmacist time at discharge and phone calls. Data Source: Study records Quality of Capture: Fair	Healthcare cost: All cause inpatient care reduced by 608.81 euro per patient. Components Included in Healthcare Cost: Inpatient Source and Valuation: Study and hospital records Measure Type: DiD Change in Mean Productivity: NR	No economic summary measures Limitations: Only inpatient for healthcare cost

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Monetary Conversions: Index year assumed 2001 in Euros	CVD 100%; HTN 65.6%; Less than High School 78.3% Time Horizon: Patients recruited Sep 2000 through Aug 2002. Intervention length 12 months.	Followed up with telephone contact monthly first 6 months and every 2 months thereafter to strengthen intervention and solve doubts/problems. Regular follow-up and measurements for intervention and control at 2, 6, and 12 months. Comparison: Usual care	Adherence: Compliance measured as % of prescribed doses taken. Reliable is classed 95-100%. At 6 months: Reliable Control (Interv) was 69% (91.1%). At 12 months reliable patients for Control (Interv) were 73.9% (85%). Data Source: Study records Measure Type: DiD	Quality of Measurement: Good	Quality of Capture: Fair Quality of Measurement: Good	
Author (Year): Murray et al. (2007) Design: RCT Method: Intervention cost and healthcare cost Funding Source: NIH Monetary Conversions: Index year assumed 2003 in US dollars	Location: Indianapolis, Indiana, USA Setting: Centralized pharmacy associated with hospital and satellite pharmacies in neighborhood clinics Eligibility: patients with diagnosed heart failure and taking at least one CVD medication for	Associated with Wishard Health (now, Eskenazi Health) in Indianapolis. Central pharmacy with pharmacist and technician. Pharmacist attended to intervention patients and usual care patients handled by technician. Also, pharmacist at decentralized pharmacies in neighborhood	Electronic Medication Event Monitoring System (MEMS). Medication adherence at 9 months was 67.9% in control and 78.8% in intervention. Difference dissipated in 3-month post intervention. ED and inpatient was 19.4% less for intervention versus control. Measure Type: DiD	Intervention Cost: 205 per patient per year Components Included in Intervention Cost: Training, equipment, and software programming. Also, pharmacist time, physician time in consultation with pharmacist, and	Per Person Per Year All Cause Healthcare Costs: Combined ED + Inpatient: 19.4% less for intervention. Outpatient was 886 lower in intervention. Inpatient cost lower in intervention by 2277. Mean total difference was 3165 lower for intervention. Components Included in Healthcare Cost: ED, inpatient, outpatient. Measure Type:	Return on investment reported as 14.0 Quality of Capture: Quality of Measurement: Quality of Estimate: Good

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	heart failure from 4 primary care, 1 cardiology practice, and Wishard Memorial Hospital. Not using any adherence aids currently. Sample Size: Intervention 122 Control 192 Characteristics: Mean age:61.4; Female:68%; Caucasian: 54%; T2DM:60.7%; HTN 93.4%; Medicaid 30%; Medicare 54%; Mean years of education:11; CVD 100%. SBP/DBP 132.9/68.9 Time Horizon: Study Feb 2001 to June 2004 Analytic period 12 months. Intervention length 9 months.	clinics. Only intervention patients got pharmacist services. All prescriptions were covered by state and local assistance plans. So cost was not an adherence factor. Pharmacist service delivered following protocol. Baseline medical history review with patients bringing meds to baseline meeting. Assess medication knowledge and skill. Dispensed 2 months of meds. Written instructions with timeline for regimen. Monitored medication use, care encounters, weight, etc. Info shared with nurse or PCP as needed by face to face/email/phone/paging. Technicians supported pharmacist		written materials. Data Source: Study observations of pharmacist activities. Quality of Capture: Good Quality of Measurement: Good	DiD Source and Valuation: ED and hospital admissions records Change in Mean Productivity: NR Quality of Capture: Good Quality of Measurement: Good	

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
		activities. Pharmacist trained by interdisciplinary team including specialists. Patients visited pharmacy primarily for refills. Patients in intervention encouraged to call or visit pharmacist with questions about medications. Authors note the intervention likely much less intense than pharmacist interventions in other studies. Comparison: Usual care				
Author (Year): Polinski et al. (2016) Design: Pre to post with matched control Economic Method: Intervention cost and healthcare cost	Location: Southeast, USA Setting: In-home for high risk and by phone otherwise. Eligibility: Patients selected from pool for those at risk for re-admission by	Pharmacists with pharmacy benefits manager. Insurer-initiated care transition based on medication reconciliation. Pharmacists from benefits manager, CVS, delivered the	Number of in-home consults for high risk intervention patients was 253.8 and telephone consults for medium risk patients was 196.9 Primary effectiveness outcome is 30-day readmission. Secondary results for	Intervention cost: Weighted mean of in-home and telephone-based groups. 677 per patient per month. Components Included in Intervention Cost:	Change in all cause and CVD healthcare cost: Reduced 1347 per patient over 30 days for all cause and reduced 1699 for CVD patients. Components Included in Healthcare Cost: Inpatient Source and Valuation:	Benefit to cost for all cause healthcare averted was 2.0. Notes: Short duration Only inpatient. Acceptable given focus was prevention of 30-day readmission. Quality of Estimate: Fair

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Funding Source: CVS healthcare Monetary Conversions: Index year assumed 2013 in US dollars	insurer. Pharmacist services offered to these patients. Benefits manager CVS further classed patients as high if at least 7 medications or 5 medications along with CHF, COPD, asthma, pneumonia, ESRD, schizophrenia, bipolar, dizziness, history of falls. Patients at moderate to high risk used 5 to 6 meds and without above conditions or used 3 to 4 meds and with one of above conditions. Initial call from insurer within 3 days of discharge to participate, of which 11% declined the service. Sample Size: Intervention 131 Control 131 Characteristics: Mean Age 61.8; Females 58%;	pharmacist intervention. CVS pharmacist contacted patients by phone for initial medication reconciliation consultation. First consult typically in-home for high risk and by phone for moderate to high risk. Pharmacist had access to all pre, during hospitalization, and post discharge medications. Pharmacist also collected other meds and supplements from members. Pharmacist activities included: patient personalized adherence education and coaching; personalized care plan also shared with PCP; educated patients about availability of insurer's support and	CVD and non-CVD (Respiratory) classed by index hospitalization cause. Results: Risk Ratio Overall was 0.5 for any condition and 0.79 for condition at index stay. Risk ratio for CVD index 0.55 and Respiratory index 0.61. Adherence Annual supply of medications for intervention (control) were 220.3 (207.4) days Data Source: Study records Measure Type: DiD	Pharmacist time and travel Data Source: Program and pharmacist records of encounters Quality of Capture: Fair Quality of Measurement: Good	Cost of single event of 30-day re-admission based on 2012 HCUP (Healthcare cost and Utilization Project) data and counts of re-admissions from study Measure Type: DiD Change in Mean Productivity: NR Quality of Capture: Fair Quality of Measurement: Good	

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
	Non-Caucasian 30%; Less than high school 19%; Unemployed 10%; High risk 57.4% and medium risk 39% Time Horizon: Study from June to November 2013. 30-day follow-up over 3 month study.	health services; scheduled follow-up appointments; coordinated care among unaffiliated providers; called providers to clarify or simplify dosing and report any change in health status. Additional follow-up calls initiated by pharmacists or patients for 30 days. Comparison: Insurer's patients in Northeast USA without pharmacist program.				
Author (Year): Scott et al. (2007) Linked to Medman (2007) Design: RCT Economic Method: Intervention cost and healthcare cost plus patient time. Funding Source: British Department	Location: Multiple sites, UK Setting: Retail pharmacies Eligibility: Patients from selected GP's with existing coronary heart disease. Patient lists screened by GPs who sent letters inviting to study	Trial name: Community Pharmacy Medicines Management (Medman) Community pharmacist led medicines management for patients with CHD. Pharmacist activities included	Self-reported compliance score at 12 months compared to baseline. No significant change from baseline value of 59 for compliance total score. Authors state baseline compliance was high. All clinical outcomes reported in terms of % meeting appropriate disease management guidelines. There was	Intervention cost: 118 per patient per year. Components Included in Intervention Cost: Pharmacist time, physician time, pharmacist training, training	Healthcare Cost Reduced by 146 per patient per year Components of Healthcare Cost: Patient and carer time and travel, all medications, and outpatient plus inpatient was for CHD only. Was substantially CHD-related. Source:	Insignificant reduction in societal cost by 50.11. Author Notes: Authors conclude with insignificant effect on clinical outcomes and insignificant effect on cost, the intervention may not be viable. Quality of Estimate: Fair

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
of Health. Scottish Executive Health Department and University of Aberdeen. Monetary Conversions: Index year is 2003 in UK pounds.	participation. Patients in intervention could choose pharmacy where available. Sample Size: Intervention 980 Control 500 Baseline Characteristics Mean Age 68.7; Female 32.6%; SBP/DBP 138.8/77.2; Total cholesterol 4.70 mmol/l; CVD 100% Time Horizon: Trial study from Nov 2002 to May 2004. Intervention length is 12 months.	medication review, health and lifestyle counseling in pharmacy setting based on information from medical records. Recommended changes in prescribing fed back to PCP. Comparison: Usual care	no significant improvement intervention versus control for any of the indicators except for patient satisfaction. Measure Type: DiD	development and delivery, patient time. Data Source: Training vendor records and study records from pharmacist logs. Quality of Capture: Fair Quality of Measurement: Good	Patient medical records. Valuation using NHS guides and or market rates. Patient time valued at average wage rates. Measure Type: DiD Productivity: NR Quality of Capture: Good Quality of Measurement: Good	
Author (Year): Tsuyuki et al. (2004) Design: RCT Economic Method: Healthcare cost.	Location: Multiple sites in 3 provinces, Canada Setting: Hospital pharmacies. Eligibility: Patients with diagnosed HF admitted to 10 hospitals. All	Review of Education on ACE Inhibitors in Congestive Heart Failure Treatment (REACT) Trial implemented in 10 hospitals - led by pharmacists and nurses.	Proportion receiving ACE I at discharge compared to admission date. Any change in dose. ACE I use increased from 58% at admission to 83% on discharge and dose from 11.3 to 15.4 enalaprin equivalents. Adherence	Intervention Cost: NR	CV-related cost per patient at 6 months was 2531 lower for intervention. Total cost per patient was 2463 lower for intervention. Main contributors were number of hospitalizations (not significant), hospital	No economic summary measure reported. Limitations: Short duration

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Funding Source: Parke Davis Canada (now Pfizer) and University of Alberta Hospital Foundation. Monetary Conversions: Index year assumed 2000 in Canadian Dollars.	received stage 1 of trial. At discharge, stage 2 offered to patients. Sample Size: Stage 1: Intervention: 1766 Control: NA Stage 2: Intervention: 140 Control: 136 Characteristics: Mean Age 71; Females 42%; Use of ACE I at stage 2 85%; CVD 100% Time Horizon: Patients recruited Sep 1999 to April 2000. Intervention length 6 months	2-stage trial. At stage 1, research coordinator (nurse or pharmacist) reviewed admissions database for eligible HF patients, reviewed medical records for ACE inhibitor prescribed and dosage. Recommendation made to attending physician. Monitoring on daily basis. Patients invited to participate in stage 2 at point of discharge. Patients randomized in stage 2 to intervention or usual care. Five components of support: salt and fluid restrictions; daily weighing; exercise; proper medication use; recognition of symptoms and knowing when to call physician. Education	Adherence based on medical possession ratio for Stage 2 patients only. Note at stage 2 ACE use was 85% for intervention and control. At 6 months ACE I adherence was 86.2% in control and 83.5% in intervention. Measure Type: DiD		length of stay and ED visits. Components Included in Healthcare Cost: Inpatient, outpatient visits, ED visits, medication. Components not Included in Healthcare Cost: None Source and Valuation: Based on follow-up self-reports confirmed with hospital and pharmacy records. Separated into CV and non-CV ED, inpatient and outpatient. Medications only counted ACE I. Unit costs from each province. Measure Type: DiD Change in Mean Productivity: NR Quality of Capture: Good Quality of Measurement: Good	

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
		materials developed from focus groups and at 8th grade level language covering HF definition, causes, symptoms; nondrug treatments; medication information and benefits; self-monitoring. At discharge, research coordinator educated patients 1-to-1. Received adherence aids such as medication organizer, medication schedule, daily weight log. Asked to contact coordinator for local support. Follow-up by telephone by RC at 2, 4 weeks and monthly thereafter for 6 months. Content was to reinforce education and adherence relating to HF and self-care. Included				

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
		monthly newsletters with success stories. Encouraged to contact physician in case of medical problems or requiring titration of ACE inhibitor. Comparison: Received stage 1 of intervention. Provided HF pamphlet at discharge.				
Author (Year): Vegter et al. (2014) Design: Model based on existing program Method: Cost-benefit and Cost per QALY Funding Source: National Heart, One author had grants from the Royal Dutch Pharmaceutical Society (KNMP) during conduct of this study.	Location: Netherlands Setting: Community pharmacies Eligibility: 3 Markov models were estimated: patients with no CVD (primary prevention); patients with history or CV and diabetes (secondary prevention); patients with past stroke (secondary prevention after stroke).	Medication Monitoring and Optimisation (MeMO) MeMO is an existing program that addresses multiple conditions. The present study focuses on effects on lipid-lowering therapies. Some generic substitutions are mandated and there is discussion about pharmacy care reimbursements.	Efficacy of medications based on large clinical trials for each of the 3 patient groups. Persistence of effects after discontinuation based on various Dutch studies: 61.5% at year 1 and 47.7% for primary and 57.7% for secondary prevention in year 2. Incidence of CV events and stroke from various Dutch observational studies. Non-CV morbidity and mortality from general Dutch population.	Intervention Cost per patient per year: 36.80 within trial (n=418 patients selected for intervention) Cost per patient per year: 2.33. Mean of 2.3 minutes of pharmacist time per patient per year for n=6,710 patients on lipid medications	Initial 5-years of Model Healthcare Cost per Patient for All Patients (Primary and Secondary Prevention): Medication increased 61 Disease management increased 53 MeMO intervention increased 7.70 CV costs reduced 247.70 Components Included in Healthcare Cost: All Source and Valuation: Outpatient visits, labs, medications. Following cardiovascular events	Life time Cost per QALY gained: Primary prevention 4585 Secondary Prevention Cost saving All patients Cost saving Probability of cost-effectiveness at 20K and 50K thresholds for the primary prevention population was 91.7% and 98.1%, respectively. Markov cohorts of 1000. Base case horizon is lifetime and shorter horizons assessed in sensitivity

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
Monetary Conversions: Index year 2012 in Euros	Sample Size: Markov model cohorts of 10K Characteristics: Mean age:61; Male:55%; No CVD or T2DM 40%; CVD or T2DM 60% Time Horizon: MeMO has been in place since 2006. Modeled cost-effectiveness based on lifetime and shorter horizons.	Comparison: Usual care	Adherence: Hazard Ratio of Discontinuation MeMO versus usual care. Primary prevention 0.47 Secondary prevention 0.54 HRQoL measured using utility weights for CV events and large U.K study that used EQ-5D questionnaire. Measure Type: DiD	Cost of MeMO activities included: Identifying non-adherent patients: 14 minutes per pharmacy per month Evaluation of non-adherent patients: 1-3 minutes per patient Contacts with non-adherent patients and their physicians: mean of 15 minutes Components Included in Intervention Cost: Pharmacist time. Source and Valuation: Pharmacist time measured for activities for sample of patients. Priced at Dutch wages. Quality of Capture: Fair	were monitored and costs calculated: fatal and non-fatal MI and stroke; revascularizations. Change in Mean Productivity: Not measured within trial. Potential productivity effects estimated from assumptions and separate analyses performed. Reviewers will not abstract this information. Measure Type: Modeled and DiD Quality of Capture: Good Quality of Measurement: Good	analyses. Costs discounted at 4% and health benefits at 1.5%. Probabilistic sensitivity analysis performed to derive 95% CIs for cost-effectiveness and cost-benefit. 5-year Intervention Cost plus Change in Healthcare Cost per Patient For All Patients (Primary and Secondary Prevention) Savings 126 Lifetime Intervention Cost plus Change in Healthcare Cost Per Patient Primary Prevention Cost increasing 255 Secondary Prevention Savings 223 All Patients Savings 32 Probabilistic sensitivity analysis indicated probability of cost-savings was 60.7% Disutility weights for CV states and events

Study Information	Study and Population Characteristics	Trial Name Intervention & Comparison	Effectiveness Findings	Intervention Costs	Healthcare Cost Averted Productivity Loss Averted	Economic Summary Measure
				Quality of Measurement: Good		drawn from Dutch studies. Limitations: No clinical outcomes for any lipids. Improved adherence extrapolated to CV outcomes. Quality of Estimate: Fair