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Economics of Team-based Care for Blood Pressure Control: Updated Community Guide Systematic Review

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Abstract

Introduction: This paper examined the recent evidence from economic evaluations of team-based care for controlling high blood pressure.

Methods: The search covered studies published from January 2011 through January 2021 and was limited to those based in the United States (U.S.) and other high-income countries. This yielded 35 studies, 23 based in the U.S. and 12 in other high-income countries. Analyses were conducted during May 2021 through February 2023. All monetary values reported are in 2020 U.S. dollars.

Results: The median intervention cost per patient per year was $438 for U.S. studies and $299 for all studies. The median change in healthcare cost per patient per year following the intervention was −$140 for both U.S. studies and for all studies. The median net cost per patient per year was $439 for U.S. studies and $133 for all studies. Median cost per quality adjusted

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life year gained was $12,897 for U.S. studies and $15,202 for all studies, which are below a conservative benchmark of $50,000 for cost-effectiveness.

Discussion: Intervention cost and net cost were higher in the U.S. compared to other high-income countries. Healthcare cost averted did not exceed intervention cost in most studies. The evidence shows team-based care for blood pressure control is cost-effective, re-affirming the favorable cost-effectiveness conclusion reached in the 2015 systematic review.

INTRODUCTION

High blood pressure in the U.S. was associated with $52.2 billion in annual healthcare and indirect costs during 2018–2019, and was a primary factor contributing to about 120,000 deaths in 2020.[1] High blood pressure and its related health consequences disproportionately affect African American persons, and people from other historically disadvantaged populations. Disparities are present in the U.S. both by race and ethnicity and by age in the awareness, diagnosis, treatment, and control of high blood pressure.[2–4]

NHANES 2015–2018 data shows that 47% of adults in the United States have high blood pressure, defined as systolic blood pressure (SBP) greater than 130 mmHg or diastolic blood pressure (DBP) greater than 80 mmHg.[5] Only a quarter of those with high blood pressure have it under control (SBP/DBP < 130/80 mm Hg) with the help of medications and lifestyle modifications. About half of those with uncontrolled high blood pressure are under no treatment with medication.[5] The reasons for suboptimal control are varied, ranging from provider inertia to patient-level barriers and poor medication adherence.[6,7] Collaborative team-based care that includes health care workers in addition to the primary care provider (PCP) can improve blood pressure outcomes through greater involvement of patients in self-management, closer and more frequent monitoring of outcomes and optimization of medication therapy.[8]

The Community Preventive Services Task Force (CPSTF)[9] reaffirmed its previous finding that team-based care interventions for control of high blood pressure were both effective[10] and cost-effective.[11] The present study describes the results from the systematic review update of research published during 2011 through January 2021 that provided the basis for the CPSTF economic findings and reaffirmation of cost-effectiveness.

METHODS

This study was conducted using established methods for systematic economic reviews developed by the Centers for Disease Control and Prevention (CDC) and approved by the CPSTF.[12] The study team included subject matter experts on cardiovascular disease (CVD) and CVD risk factors from various agencies, organizations, and academic institutions; members of the CPSTF; and experts in systematic economic reviews from the Community Guide Program at the CDC. Two reviewers independently screened the search yield and abstracted information from the included studies. Unresolved disagreements between reviewers were taken to the full review team for majority consensus.

Team-based care to improve blood pressure control is an organizational intervention that uses a multidisciplinary team to improve the quality of care. Team-based care is established by adding new staff or changing the roles of existing staff who work with a PCP. Each team includes the patient, the patient's PCP, and other professionals such as nurses, pharmacists, dietitians, and community health workers (CHW). Team members provide process support and share responsibilities of blood pressure control to complement the activities of the PCP. Responsibilities include medication management, patient follow-up, and medication adherence and self-management support.[13]

The study team developed an economic analytic framework identifying the intervention, population, and economic outcomes of interest.[14] The framework also identified components of each economic outcome that are drivers, components that contribute substantially to the magnitude of estimates. The following research questions were addressed by the review:

- What is the cost to implement the intervention?
- What are the economic benefits of the intervention?
- What is intervention cost per unit reduction in systolic blood pressure (SBP)?
- How do intervention costs compare to economic benefits?
- What is the return on investment?
- Is the intervention cost-effective?

The economic outcomes related to the research questions are defined below.

The components of cost to implement team-based care are labor cost of the team members, cost of time and materials for training, and the cost of any tools provided to enhance team communication. These may be combined with additional interventions, such as self-measured blood pressure monitoring. All these components are considered drivers of intervention cost.

The effectiveness of the intervention is measured in terms of reduction in SBP. Intervention cost per unit reduction in SBP is a useful metric to measure what it costs to achieve a unit of effectiveness. SBP is chosen because it is the blood pressure outcome most frequently reported in studies.

Team-based care may increase healthcare cost in the short term through increased contacts with providers and increased prescription and use of medications. Improvements in blood pressure control and other risk factors for CVD such as type 2 diabetes (T2DM) and hyperlipidemia addressed by team-based care will lead to reduced cardiovascular morbidity and mortality. Reduced morbidity will lead to reductions in outpatient visits, inpatient stays, medications, and emergency department (ED) visits. Therefore, effective interventions are expected to avert healthcare cost in the longer term, producing negative values for estimates of change in healthcare cost. Consequently, all components of healthcare cost (e.g., outpatient visits, ED) are considered drivers of its magnitude.

Net cost is the sum of intervention costs and change in healthcare costs. Return on investment (ROI) is the ratio of the difference between averted healthcare cost and intervention cost to intervention cost and is generally expressed as a percentage. ROI takes a health systems perspective since the intervention cost is assumed to be borne by a healthcare payer and the only benefit considered is averted healthcare cost. Net cost becomes negative and favorable when averted healthcare cost exceeds intervention cost., which also implies a positive and favorable ROI.

Cost-benefit is expressed as the ratio of economic benefits to intervention cost. Both benefits and cost are measured in monetary terms and are constituted from a societal perspective, where all costs and benefits are considered regardless of who pays and who benefits.

Improved blood pressure control will prevent CVD events and increase both quantity and quality of life years lived. Economic evaluations generally measure this outcome as quality-adjusted life years (QALYs) gained or disability-adjusted life years (DALYs) averted.

Reduced morbidity and mortality lead to greater productivity of patients at their worksites due to both increased number of hours of work and increased output per hour of work. Productivity is considered a driver of economic benefits because of the intervention.

Cost-effectiveness is the net cost per QALY gained or the net cost per DALY averted. The CPSTF considers an intervention to be cost-effective when the net cost per QALY gained ≤ $50,000[15] or the net cost per DALY averted ≤ per capita GDP of the relevant country.[16] The $50,000 per QALY gained benchmark for cost-effectiveness is very conservative, given it was first introduced some decades ago and persists in the literature without adjustment for inflation or economic growth.[12]

A tool for quality assessment of economic evidence was developed for the scope of this study and is available as Appendix materials online. Two raters used the tool to independently assign and later reconcile points which indicate limitations in the quality of the estimates for variables related to intervention cost, healthcare cost, QALY, and net cost per QALY gained. Each estimate was scored as good, fair, or limited in quality of capture, based on inclusion of components deemed to be drivers of magnitude for the estimate. Each estimate also was scored as good, fair, or limited in quality of measurement, based on the appropriateness of analysis and methods used to derive the estimate. The final quality score for an estimate is the lower of the quality assessed for capture and quality assessed for measurement. The quality score assigned to an estimate that is a combination of other estimates such as net cost is the lower of the quality scores assigned to its parts, intervention cost and change in healthcare cost estimates. Estimates that received a limited quality score were removed from further consideration.

While CPSTF systematic economic review methods recommend a societal perspective for outcomes, evaluations of team-based care interventions might take a health systems perspective since these interventions are generally implemented in healthcare settings. Estimates for healthcare cost or QALY that are summed over values from multiple years must be discounted to present values, and sensitivity analysis must be conducted for modeled estimates that are based on assumed model input values. These expectations, among others, for the ideal conduct of economic evaluations were built into the tool for quality assessment of estimates.

All monetary values in the results and discussion sections are in 2020 U.S. dollars, adjusted for inflation using the Consumer Price Index from the Bureau of Labor Statistics[17] and converted from foreign currency denominations using consumption purchasing power parities from the World Bank.[18] Estimates are presented in per patient per year (PPPY) terms, wherever possible. Summaries of estimates are reported as medians for continuous variables (along with interquartile intervals (IQI) when there are ≥4 estimates) and as frequencies for categorical variables. All analyses were conducted using Microsoft EXCEL during May 2021 through February 2023.

A search of the peer-reviewed literature was conducted with the following inclusion criteria: met the definition of the intervention, conducted in a high-income country according to World Bank criteria,[19] written in English, and included ≥1 economic outcomes described in the research questions. Studies that implemented team-based care for CVD risk factors such a hyperlipidemia or T2DM were included if blood pressure was a criterion in patient selection or blood pressure outcomes were reported. The search was conducted in Medline, CINAHL, Cochrane, and EconLit for papers published during January 2011 through January 2021. Reference lists in included studies were screened and subject matter experts were consulted for additional studies. The detailed search strategy is available on The Community Guide website.[13]

RESULTS

Figure 1 shows the search yield for the economic review that resulted in 35[20–54] included studies, providing information on intervention cost (29 studies),[20,21,23–30,32–38,40–43,45–49,51,52,54] change in healthcare cost (16 studies),[20,21,23,24,28–31,33,34,37,39,40,51,52,54] net cost (17 studies),[20,21,23,24,28–30,33,34,37,40,44,50–54] and cost-effectiveness (14 studies).[22–24,27,29,30,35,36,40,41,43,47,51,53] There were no cost-benefit studies. Studies are presented in alphabetical order within tables, beginning with studies based in the U.S. Table 1 provides intervention and population characteristics. There were 23 studies based in the U.S.,[20,21,24,27,28,30–32,34–36,39–42,44–49,53,54] 4 in the U.K.,[23,29,43,52] 2 each in in Argentina,[22,33] Canada,[37,51] and China (Hong Kong),[25,26] and 1 each in Australia,[38] and Singapore.[50] The study designs were Randomized Control Trials (RCT) (15 studies),[20–23,25,28,33,40,46,49–54] modeled based on RCTs (8 studies),[24,29,30,35,37,43,44,47] pre to post with comparison group (9 studies),[26,31,34,36,38,39,41,42,48] cross-sectional (2 studies),[32,45] or modeled with inputs from review of the literature (1 study).[27]

The median sample size was 261 for U.S. studies and 200 for non-U.S. studies. The median length of intervention was 12 months. Among all studies, the settings were: primary care clinic (26 studies);[20,21,23,24,27–30,32,35,36,38–48,50–52,54] hospital clinic (2 studies);[25,26] public health clinic (2 studies);[22,33] worksite wellness (2 studies);[31,34] pharmacy (1 study);[49] ED (1 study);[53] and mixed setting (1 study).[37] The median age of patients in U.S. studies was 58 years (IQI: 54 to 60) with 57% female while the median age in non-U.S studies was older at 61 years (IQI: 56 to 67) with smaller female representation at 48%. For studies based in the U.S., the median of the percentage of patients from historically disadvantaged racial and ethnic populations was 53% (IQI: 13% to 90%). Study populations were urban (22 studies),[21–26,28,29,33,35–37,39,41,42,47,49–54] rural (1 study),[32] urban-rural mix (8 studies),[20,27,31,34,38,40,44,48] and 4 studies not reporting location.[30,43,45,46]

High blood pressure was defined as SBP/DBP ≥ 140/90 mmHg (≥130/80 for patients with T2DM), and treatments were targeted to reduce blood pressure to below those thresholds in most studies. The exceptions were 3 studies,[28,43,52] which set the goal to be 5 mmHg lower for home-based blood pressure measurements. The median reduction in mmHg of SBP was 6.2 (IQI: 4.5 to 8.6) across all studies, (Table 1).[21,22,24,25,27–30,33,35–37,40–44,46,49–52,54]

Of the 35 included studies, 29[20–24,27–39,41–46,48,49,52–54] had a focus on blood pressure control and others had hypertension as a patient baseline condition with other conditions such as: depression (1 study);[40] dyslipidemia (1 study);[26] and T2DM (4 studies).[25,47,50,51] Members added to the team to support the physician were: pharmacist (17 studies);[24–28,30,36,37,39,41,42,44–46,49–51] nurse (15 studies);[27,29,32,37–40,42,43,45,48,50,52–54] medical assistant (5 studies)[32,45,48,53,54] CHW, health coach, counselor, educator, or adviser (12 studies);[20–23,29,32,33,35,39,45,47,54] dietitian (4 studies);[36,39,50,54] mental health provider (2 studies).[40,48]

Table 2 shows that the number of estimates that were good (16) and fair (15) for quality of intervention cost were about the same. The most frequent reason for assignment of limitation points was failure to include the cost of training followed by failure to include cost of communication tools. Quality of estimates for change in healthcare cost was mostly rated fair (10), with 6 rated as good quality. The driver of healthcare cost that was most frequently missing was ED visits. The most frequent reasons for limitation points assigned to healthcare cost estimates included use of healthcare utilization data for all causes rather than those related to CVD and CVD risk factors and lack of adjustment for covariates that may affect healthcare utilization such as patient age. Table 3 shows there were 11 good quality estimates for net cost per QALY gained and 4 estimates were of fair quality. The most frequent reason for assignment of limitation points for cost-effectiveness estimates were short time horizon and the assumption of no fade-out for intervention effect.

Table 2 shows the median intervention cost PPPY for U.S. studies was $438 (IQI: $285 to $649) based on 20 estimates from 19 studies.[20,21,24,27,28,30,32,34–36,40–42,45–49,54] The median intervention cost PPPY for all studies was $299 (IQI: $168 to $518) based on 31 estimates from 29 studies.[20,21,23–30,32–38,40–43,45–49,51,52,54]

Table 2 shows the median reduction in mmHg of SBP was 6.3 (IQI: 4.9 to 9.0) across all studies.[21,24,25,27–30,33,35–37,40–43,46,49,51,52,54] The median intervention cost per mmHg reduction in SBP was $47 (IQI: $31 to $62) across all studies[21,24,25,27–30,33,35–37,40–43,46,49,51,52,54] and $55 (IQI: $44 to $66) for studies based in the U.S.[21,24,27,28,30,35,36,40–42,46,49,54]

Of those U.S. studies reporting patient race or ethnicity and intervention cost per unit reduction in SBP,[21,28,30,35,36,40–42,46,49,54] studies with > 50% of patients from historically disadvantaged populations reported a median reduction in SBP and median intervention cost per unit reduction in SBP of 6.3 (IQI: 6.1 to 8.0) and $47 (IQI: $44 to $59)[21,35,36,46,49,54]versus 10.3 mmHg (IQI: 9.1 to 11.7) and $59 (IQI: $54 to $139) for studies with majority White patients.[28,30,40–42] The median reduction in SBP and median intervention cost per unit reduction in SBP for studies of teams with pharmacists, with nurses, and with CHWs/coaches/counselors/educators/advisers were: 8.9 mmHg (IQI: 6.0 to 10.8) and $44 (IQI: $31 to $58);[24,25,27,28,30,36,37,41,42,46,49,51] 5.2 mmHg (IQI: 3.7 to 8.5) and $54 (IQI: $28 to $66);[27,29,37,40,42,43,52,54] 6.4 mmHg (IQI: 6.2 to 6.6) and $63 ($48 to $67),[21,29,33,35,54] respectively.

Table 2 shows that the median change in healthcare cost PPPY in the U.S. studies was −$140 (-$639 to $226) based on 10 estimates from 10 studies.[20,21,24,28,30,31,34,39,40,54]Across all the studies, the median change in healthcare cost PPPY was −$140 (IQI: −$386 to $30) based on 16 estimates from 16 studies.[20,21,23,24,28–31,33,34,37,39,40,51,52,54] Across all studies, the median change in healthcare cost PPPY coded with causes associated with CVD or CVD risk factors was −$48 (IQI: −$172 to $59).[21,24,28–31,33,37,51,52,54] Across all studies that measured healthcare cost associated with all causes (all diseases and risk factors), the median change in healthcare cost PPPY was −$684 (IQI: −$813 to −$167).[20,23,34,39,40]

Net cost is measured as the sum of the change in healthcare cost following the intervention and the cost of the intervention. A negative value indicates averted healthcare cost exceeds intervention cost. Estimates of net cost are shown in Table 3. The median net cost PPPY for U.S. studies was $439 (IQI: $34 to $821) based on 12 estimates from 10 studies,[20,21,24,28,30,34,40,44,53,54] and the median across all studies was $133 (IQI: −$16 to $495) based on 19 estimates from 17 studies.[20,21,23,24,28–30,33,34,37,40,44,50–54] The net cost estimates were a mix of negative and positive values, with 5 studies[20,34,37,50,51] showing averted healthcare cost exceeded intervention cost and 12 studies[21,23,24,28–30,33,40,44,52–54] showing intervention cost exceeded averted healthcare cost. Across all studies, the median net cost coded with causes associated with CVD or CVD risk factors was $371 (IQI: $87 to $508).[21,24,28–30,33,37,51,52,54]

The net cost for U.S. studies with majority of patients from historically disadvantaged populations were $751[21] and $408[54] compared to a median of $784 (-$751 to $ $1,326)[20,27,30,40] for studies with majority White patients. For all studies, the median net cost for studies of teams with pharmacists, with nurses, and with CHWs/coaches/counselors/educators/advisers were: $470 (IQI: −$63 to $520);[24,28,30,37,51] $334 (IQI: $133 to $408);[29,37,40,52,54] $221 ($87 to $383),[20,21,23,29,33,54] respectively.

Table 3 shows the median ROI for U.S. studies was −90% (IQI: −160% to −30%) based on 8 estimates from 8 studies[20,21,24,28,30,34,40,54] and was −80% (IQI: −130% to 20%) for all studies based on 14 estimates from 14 studies.[20,21,23,24,28–30,33,34,37,40,51,52,54] A positive value of ROI indicates a favorable economic outcome in terms of cost savings from a healthcare systems perspective. As in the case of net cost, the ROI estimates indicate the evidence is mixed in terms of favoring the intervention from the perspective of a healthcare system. Across all studies, the median ROI of healthcare costs associated with CVD, or CVD risk factors was −90% (IQI: −140% to −70%).[21,24,28–30,33,37,51,52,54]

Table 3 shows the median net cost per QALY gained reported in U.S. studies was $12,897 (IQI: $3,300 to $43,760) based on 9 estimates from 9 studies,[24,27,30,35,36,40,41,47,53] with 6 estimates of good quality[24,27,30,35,40,41] and 3 of fair quality.[36,47,53] The median net cost per QALY gained reported in all studies was $15,202 (IQI: $3,569 to $34,509) based on 15 estimates from 14 studies.[22–24,27,29,30,35,36,40,41,43,47,51,53] There were no studies that reported cost per DALY averted. Only 2 studies[27,29] included averted costs of productivity losses when calculating the cost-effectiveness ratios, indicating the cost-effectiveness evidence is predominantly from a health system perspective.

The median cost per QALY gained reported in U.S. studies with hypertension as focus was $12,897 ($3,470 to $45,051) based on 7 estimates from 7 studies,[24,27,30,35,36,41,53] and for all studies, it was $14,049 (IQI: $3,605 to $31,141) based on 12 estimates from 11 studies.[22–24,27,29,30,35,36,41,43,53]

The mean cost per QALY gained for U.S. studies with majority of patients from historically disadvantaged populations was $37,912 (Range: $12,897 to $57,078)[35,36,47] versus $17,815 (Range: $2,276 to $ $48,856)[30,40,41] for studies with majority White patients. For all studies, the median cost per QALY gained for studies of teams with pharmacists, with nurses, and with CHWs/coaches/counselors/educators/advisers were: $14,912 (IQI: $3,385 to $43,188);[24,27,30,36,41,51] $12,354 (IQI: $3,300 to $15,202);[27,29,40,43] $18,981 ($14,626 to $28,010),[23,29,35,47] respectively.

DISCUSSION

The economic evidence shows team-based care interventions to control blood pressure are cost-effective based on a cost-effectiveness benchmark of $50,000. Intervention cost was higher in U.S. studies compared to studies in other high-income countries. Intervention cost per unit change in SBP varied by composition of the care team and by the race and ethnicity of the study population in U.S. studies. Healthcare cost averted was greater in U.S. studies compared to studies in other high-income countries. Net cost and ROI showed mixed results whether averted healthcare cost exceeded the cost of intervention.

Based on the median reduction in SBP (8.5 mmHg for U.S. studies) and the median intervention cost ($438 PPPY for U.S. studies) found in this review, team-based care for blood pressure control can have substantial population level impact. An indication of the impact is provided by Dehmer et al., 2016,[27] which found team-based care to be highly cost-effective at $3,300 per QALY gained when modeled for the U.S. population with intervention cost of $1,002 and SBP reduction of 9.7 as inputs.

Comparing the results from the previous review (based on studies published from 1981 through 2012 and monetary values converted to 2020 U.S dollars)[11] to the present review (based on studies published from 2011 through 2019), the median reduction in mmHg of SBP increased from 4.5 to 6.3 and median intervention cost per patient decreased from $353 to $299. The median intervention cost per patient per unit reduction in SBP fell from $108 in the previous review to $47 in the present review because intervention cost per patient decreased while intervention effectiveness in reducing SBP increased during the period between the two reviews. Intervention cost in the present review could be lower because the larger intervention groups allowed fixed costs to be spread over more patients, with median of 252 patients in the present review versus median of 149 patients in the previous review. The greater effectiveness of the intervention in the present review could be because of the higher baseline SBP, with a median of 149 mmHg in the present review versus 143 mmHg in the previous review. Other explanations could be the greater attention to SBP by studies in the current review, improved integration of team-based care in health systems,[4] increased effectiveness and use of generic[55,56] and fixed-dose medications,[57,58] and greater guidelines-driven treatment.[59,60] The median change in healthcare cost was −$140 in the present review versus $81 in the previous review. It is unclear why there is greater healthcare cost averted in the present review. One explanation may be the greater blood pressure reductions leading to better health outcomes. There were 3 studies reporting cost-effectiveness in the previous review ranging from $5,653 to $119,573 per QALY while there are 14 in the present review reporting a median of $15,202.

Intervention cost and outcomes varied by team composition and geographic location of studies. Teams that included pharmacists produced a greatest reduction in SBP and at lowest cost per unit reduction, followed by teams that included nurses. Teams that included CHWs, health coaches, advisers, or educators produced less reduction in SBP and at higher cost per unit reduction; the higher cost may be attributable to additional staff required for oversight. The intervention cost to achieve a unit reduction in SBP was lower for U.S. studies that drew its patients substantially from historically disadvantaged populations. Median change in healthcare cost in the U.S. studies was higher than that in studies outside the U.S., possibly reflecting that healthcare costs are higher in the U.S. compared to other high-income countries.[61]

Team-based care interventions reduced blood pressure, and other clinical outcomes related to T2DM and hyperlipidemia. Improvements in clinical outcomes beyond blood pressure may have occurred even in studies focused on hypertension simply due to greater patient contacts and contacts with a variety of providers.

Favorable clinical outcomes did not translate to reductions in healthcare cost in 5 studies.[21,24,30,40,52] Potential explanations are the short duration between baseline and follow-up (6 to 12 months) or increase in the medication and outpatient components of healthcare utilization and cost.

Limitations

A limitation of the present study is that summary statistics are reported across studies with very heterogeneous interventions, differing by type of team member, setting, and team organization and by populations served. None of the studies were conducted from a societal perspective that fully accounted for the value of patient time and productivity. Further, studies differed in their inclusion of components that are expected to drive the magnitude of estimates for intervention cost and healthcare cost. Many studies that reported change in healthcare cost based their estimates on healthcare utilization due to all causes and not specific to CVD or CVD risk factors. With only one study providing evidence for exclusively rural populations, there is a gap in evidence whether team-based care interventions can be successfully implemented in rural settings. Some studies did not report patient health outcomes (e.g., blood pressure, cholesterol) against which to gauge the change in healthcare cost. The lack of reporting for estimates of components of healthcare cost in many studies meant that their contribution to the magnitude of change in healthcare cost could not be determined.

CONCLUSIONS

The systematic economic review found team-based care interventions for blood pressure control are cost-effective based on a median estimate of $12,897 per QALY gained for U.S. studies and $15,202 per QALY gained for all studies, which are below a conservative $50,000 benchmark.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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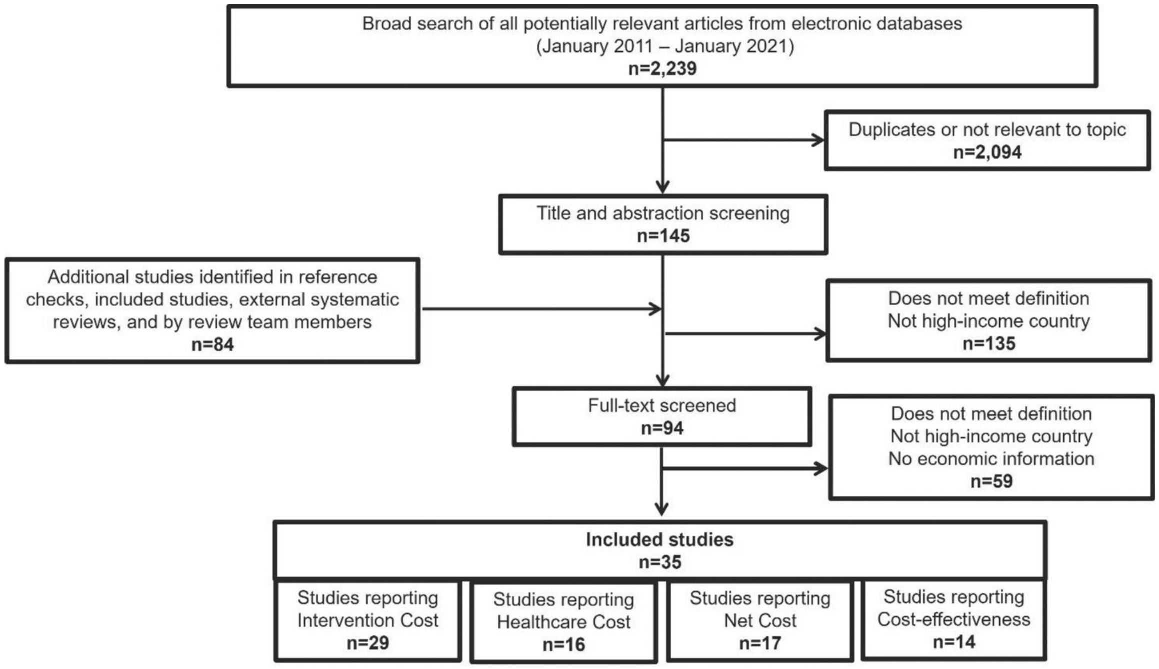

Figure 1.
Search Yield

Table 1.

Intervention Characteristics, Patient Characteristics, Baseline and Change in Clinical Indicators (n=35 studies)

Study **Country** **Study Design**	**Intervention sample size** **Setting[a]** **Urbanicity** **Intervention Duration in Months**	**Non-Physician Team Members**	**Mean Age in Years** **Percent Female** **Percent Non-White Patients**	**Baseline Mean Clinical Indicators [Change][b]**	**Condition[c] Focus**
Adair 2013[20] U.S.A. RCT	1,429 PC Mixed 12	CHW	61 y 50% 10%	SBP 129 [NR]; DBP 75 [NR] A1c 7.4 [NR]; LDL 86 [NR]	BP, T2DM, HF
Allen 2014[21] U.S.A. RCT	261 PC Urban 12	CHW	54 y 72% 79%	SBP 140 [−6.2]; DBP 83 [−3.1] A1c 8.9 [−0.5]; LDL 122 [−16]	BP, Lipids, T2DM, CVD
Billups 2014[24] U.S.A. Modeled (RCT)	175 PC Urban 6	Pharmacist	60 y 38% NR	SBP 149 [−12.5]; DBP 90 [NR] A1c NR [NR]; LDL NR [NR]	BP
Dehmer 2016[27] U.S.A. Modeled	Model PC Mixed 12	Nurse or Pharmacist	NR 52% NR	SBP 142 [−8.1]; DBP NR [NR] A1c NR [NR]; LDL 120 [−11.9]	BP
Dehmer 2018[28] U.S.A. RCT	148 PC Urban 12	Pharmacist	63 y 48% 13%	SBP 150 [−9.7]; DBP 83 [−5.1] A1c NR [NR]; LDL NR [NR]	BP
Fishman 2013[30] U.S.A. Modeled (RCT)	261 PC NR 12	Pharmacist	59 y 56% 21%	SBP 152 [−8.9]; DBP 89 [−3.6] A1c NR [NR]; LDL NR [NR]	BP
Goetzel 2013[31] U.S.A. Pre-post with Comparison	8,609 WW Mixed 72	NR	48 y 25% NR	Higher proportion with BP control Higher proportion with cholesterol control	BP, T2DM, CVD
Halladay 2017[32] U.S.A. Cross-sectional	1,238 PC Rural NA	Nurse, Nurse Practitioner, Medical Assistant, Informatics Staff, Health Coach	NR NR 52%	SBP NR [NR]; DBP NR [NR] A1c NR [NR]; LDL NR [NR]	BP
Henke 2011[34] U.S.A. Pre-post with Comparison	31,823 WW Mixed NA	NR	40 y 45% NR	SBP NR [NR]; DBP NR [NR] A1c NR [NR]; LDL NR [NR]	BP, Lipids, Weight, Tobacco

Study Country Study Design	Intervention sample size Setting[a] Urbanicity Intervention Duration in Months	Non-Physician Team Members	Mean Age in Years Percent Female Percent Non-White Patients	Baseline Mean Clinical Indicators [Change][b]	Condition[c] Focus
Hollenbeak 2014[35] U.S.A. Modeled (RCT)	136 PC Urban 6	CHW, Health Educator	61 y 70% 100%	SBP 141 [−6.4]; DBP 81 [NR] A1c NR [NR]; LDL 116 [NR]	BP, T2DM
Hong 2018[36] U.S.A. Pre-post with Comparison	629 PC Urban 3	Dietitian, Pharmacist	60 y 58% 70%	SBP 148 [−9]; DBP 86 [−4] A1c NR [NR]; LDL NR [NR]	BP
Isetts 2012[39] U.S.A. Pre-post with Comparison	823 PC Urban 12	Pharmacist, Nurse, Health Coach, Diabetes Educator, Dietitian	NR 60% NR	SBP NR [NR]; DBP NR [NR] A1c NR [NR]; LDL NR [NR]	BP, Lipids, T2DM
Katon 2012[40] U.S.A. RCT	106 PC Mixed 12	Nurse, Psychiatrist	57 y 48% 25%	SBP 136 [−3.4]; DBP NR [NR] A1c 8.1 [−0.56]; LDL 107 [−9.1]	Depression, CVD, T2DM
Kulchaitanaroaj 2015a[42] U.S.A. Pre-post with Comparison	101 PC Urban 9	Pharmacist, Nurse	60 y 57% 12%	SBP 152 [−15.4]; DBP 85 [−4.5] A1c NR [NR]; LDL NR [NR]	BP
Kulchaitanaroaj 2015b[42] U.S.A. Pre-post with Comparison	252 PC Urban 6	Pharmacist, Nurse	59 y 65% 10%	SBP 154 [−10.8]; DBP 87 [−5.1] A1c NR [NR]; LDL NR [NR]	BP
Kulchaitanaroaj 2017[41] U.S.A. Pre-post with Comparison	399 PC Urban 6	Pharmacist	57 y 57% 14%	SBP 151 [−12]; DBP 87 [NR] A1c NR [NR]; LDL NR [NR]	BP
Overwyk 2019a[44] U.S.A. Modeled (RCT)	Model PC Mixed 60	Pharmacist	NR 53% NR	SBP 145 [−8.5]; DBP NR [NR] A1c NR [NR]; LDL 120 [−8.1]	BP
Overwyk 2019b[44] U.S.A. Modeled (RCT]	Model PC Mixed 60	Pharmacist	NR 58% NR	SBP 153 [−8.5]; DBP NR [NR] A1c NR [NR]; LDL 120 [−8.1]	BP
Overwyk 2019c[44] U.S.A. Modeled (RCT)	Model PC Mixed 60	Pharmacist	NR 59% NR	SBP 153 [−8.5]; DBP NR [NR] A1c NR [NR]; LDL 119 [−8.1]	BP

Study Country Study Design	Intervention sample size Setting[a] Urbanicity Intervention Duration in Months	Non-Physician Team Members	Mean Age in Years Percent Female Percent Non-White Patients	Baseline Mean Clinical Indicators [Change][b]	Condition[c] Focus
Panattoni 2018[45] U.S.A. Cross-sectional	11,873 PC NR NA	Nurse Practitioner, Pharmacist, Medical Assistant, Health Coach	58 y 48% 71%	SBP NR [NR]; DBP NR [NR] A1c NR [NR]; LDL NR [NR]	BP, T2DM
Polgreen 2015[46] U.S.A. RCT	401 PC NR 9	Pharmacist	61 y 60% 54%	SBP 149 [−6.1]; DBP 85 [−2.9] A1c NR [NR]; LDL NR [NR]	BP
Prezio 2014[47] U.S.A. Modeled (RCT)	90 PC Urban 12	CHW	47 y 67% 94%	SBP 126 [NR]; DBP 78 [NR] A1c 8.2 [−1.1]; LDL 111 [NR]	T2DM
Reiss-Brennan 2016[48] U.S.A. Pre-post with Comparison	63,396 PC Mixed 48	Nurse, Medical Assistant, Mental Health Provider	NR 62% 6%	Reduced odds of BP control Improved odds of quality of diabetes care	BP, T2DM, Depression
Shireman 2016[49] U.S.A. RCT	207 Pha Urban 6	Pharmacist, Pharmacy Technician	54 y 62% 100%	SBP 151 [−5.6]; DBP 92 [−2.3] A1c NR [NR]; LDL NR [NR]	BP
Twiner 2017[53] U.S.A. RCT	58 ED Urban 12	HTN Specialist, Nurse Practitioner, Physician Assistant	49 y 65% 95%	SBP 151 [NR]; DBP 97 [NR] A1c NR [NR]; LDL NR [NR]	BP
Wagner 2016[54] U.S.A. RCT	224 PC Urban 12	Nurse, Medical Assistant, Health Coach, Dietitian	53 y 55% 93%	SBP 158 [−8.6]; DBP NR [NR] A1c 9.8 [−1.2]; LDL 146 [−27.9]	T2DM, BP, Lipids
Augustovski 2018[22] Argentina RCT	743 PH Urban 18	CHW	56 y 53% NA	SBP 152 [−5.3]; DBP 92 [−5.1] A1c NR [NR]; LDL NR [NR]	BP
Barton 2012[23] U.K. RCT	72 PC Urban 3	CHW	53 y 59% NA	SBP NR [NR]; DBP NR [NR] A1c NR [NR]; LDL NR [NR]	BP, Lipids, T2DM, Weight, Tobacco
Chan 2012[25] China – Hong Kong RCT	51 HC Urban 9	Pharmacist	63 y 41% NA	SBP 141 [−3.3]; DBP 75 [−2.1] A1c 9.7 [−1.2]; LDL 101 [−12.8]	T2DM

Study Country Study Design	Intervention sample size Setting[a] Urbanicity Intervention Duration in Months	Non-Physician Team Members	Mean Age in Years Percent Female Percent Non-White Patients	Baseline Mean Clinical Indicators [Change][b]	Condition[c] Focus
Chung 2011[26] China – Hong Kong Pre-post with Comparison	150 HC Urban 24	Pharmacist	56 y 55% NA	SBP NR [NR]; DBP NR [NR] A1c NR [NR]; LDL 137 [−18.9]	Lipids
Dixon 2016[29] U.K. Modeled (RCT)	325 PC Urban 12	Health Adviser, Nurse	67 y 20% NA	SBP 148 [−2.7]; DBP 81 [NR] A1c NR [NR]; LDL NR [0]	BP, Weight, Tobacco
He 2017[33] Argentina RCT	743 PH Urban 18	CHW	56 y 53% NA	SBP 152 [−6.6]; DBP 92 [−5.3] A1c NR [NR]; LDL NR [NR]	BP
Houle 2012[37] Canada Modeled (RCT)	115 Various Urban 6	Pharmacist, Nurse	66 y 35% NA	SBP 143 [−5.6]; DBP 76 [−2.1] A1c NR [NR]; LDL NR [NR]	BP
Iles 2014[38] Australia Pre-post with Comparison	120 PC Mixed 12	Nurse	69 y 49% NA	SBP NR [NR]; DBP NR [NR] A1c NR [NR]; LDL NR [NR]	T2DM, BP, CVD
Monahan 2019a[43] U.K. Modeled (RCT)	395 PC NR 12	Nurse	67 y 46% NA	SBP 153 [−3.5]; DBP 85 [−1.5] A1c NR [NR]; LDL NR [NR]	BP
Monahan 2019b[43] U.K. Modeled (RCT)	393 PC NR 12	Nurse	67 y 47% NA	SBP 153 [−4.7]; DBP 86 [−1.3] A1c NR [NR]; LDL NR [NR]	BP
Siaw 2017[50] Singapore RCT	214 PC Urban 6	Pharmacist, Nurse, Dietitian	59 y 48% NA	SBP 129 [−3.8]; DBP NR [NR] A1c 8.6 [−0.5]; LDL NR [NR]	T2DM
Simpson 2015[51] Canada RCT	131 PC Urban 12	Pharmacist	57 y 59% NA	SBP 130 [−6.0]; DBP 75 [−1.0] A1c 7.0 [−0.02]; LDL 91 [−0.77]	T2DM
Stoddart 2013[52] U.K. RCT	200 PC Urban 6	Nurse	61 y 42% NA	SBP 146 [−4.3]; DBP 87 [−2.3] A1c NR [NR]; LDL NR [NR]	BP
Summary for U.S studies Median (IQI)	Sample Size 261 (155 to 1134)	Pharmacist 15; Nurse 10; Dietitian 3; CHW,	Age 58 y (54 y to 60 y) Percent female 57%	SBP 150 (142 to 152) [−8.5 (−9.0 to −6.2)] DBP 86 (83 to 89) [−3.8 (−4.7 to −3.1)]	BP 24, HF 1, Depression 3, Lipids

Study Country Study Design	Intervention sample size Setting[a] Urbanicity Intervention Duration in Months	Non-Physician Team Members	Mean Age in Years Percent Female Percent Non-White Patients	Baseline Mean Clinical Indicators [Change][b]	Condition[c] Focus
Or Frequency	Setting HC 0; PC 19; PH 0; Pha 1; Various 0; WW 2 Duration 12 (6 to 16)	Coach, Counselor, Educator or Adviser 8; Medical Assistant 5; Mental Health Provider 2	(50% to 62%) Percent Non-White 53% (13% to 90%)	A1c 8.2 (8.1 to 8.9) [−0.8 (−1.1 to −0.5)] LDL 120 (112 to 120) [−9.1 (−14.0 to −8.1)]	4, T2DM 10, CVD 2, Weight 1, Tobacco 1
Summary for non-U.S. studies Median (IQI) Or Frequency	Sample Size 200 (120 to 393) Setting HC 2; PC 7; PH 2; Pha 0; Various 1; WW 0 Duration 12 (6 to 12)	Pharmacist 5; Nurse 7; Dietitian 1; CHW, Coach, Counselor, Educator or Adviser 4; Medical Assistant 0; Mental Health Provider 0	Age 61 y (56 y to 67 y) Percent female 48% (42% to 53%) Percent Non-White NA	SBP 147 (142 to 152) [−4.5 (−5.5 to −3.6)] DBP 85 (76 to 87) [−2.1 (−3.0 to −1.5)] A1c 8.6 (7.8 to 9.2) [−0.5 (−0.9 to −0.3)] LDL 101 (96 to 119) [−12.8 (−15.9 to −6.8)]	BP 9, HF 0, Depression 0, Lipids 2, T2DM 5, CVD 1, Weight 2, Tobacco 2
Summary for all studies Median (IQI) Or Frequency	Sample Size 252 (134 to 686) Setting HC 2; PC 26; PH 2; Pha 1; Various 1; WW 2 Duration 12 (6 to 12)	Pharmacist 20; Nurse 17; Dietitian 4; CHW, Coach, Counselor, Educator or Adviser 126; Medical Assistant 5; Mental Health Provider 2	Age 59 y (56 y to 61 y) Percent female 54% (48% to 59%) Percent Non-White NA	SBP 149 (141 to 152) [−6.2 (−8.6 to −4.5)] DBP 85 (81 to 88) [−3.0 (−4.7 to −2.1)] A1c 8.4 (7.9 to 9.1) [−0.6 (−1.2 to −0.5)] LDL 119 (107 to 120) [−10.5 (−15.2 to −8.1)]	BP 33, HF 1, Depression 3, Lipids 6, T2DM 15, CVD 3, Weight 4, Tobacco 3

[a] ED, emergency department; HC, hospital clinic; PC, primary care clinic; PH, public health clinic; Pha, Pharmacy; WW, worksite wellness

[b] A1c, mean glycated hemoglobin in percent; DBP, mean diastolic blood pressure in millimeters of mercury; LDL, mean low density lipoprotein in mg/dL; SBP, mean systolic blood pressure in millimeters of mercury

[c] BP, high blood pressure; CVD, cardiovascular disease; HF, heart failure; T2DM, type 2 diabetes

IQI, interquartile interval; NA, not applicable; NR, not reported

Table 2.

Intervention Cost, Healthcare Cost, and Intervention Cost per Unit Reduction in SBP

Study Country	Non-Physician Team Members Percent Non-White Patients	Intervention sample size Intervention duration in months	Intervention cost per patient per year (Quality of Estimate)	Drivers included in intervention cost[a]	Change in healthcare cost per patient per year (Quality of Estimate)	Drivers included in healthcare cost[b]	Change in SBP in mmHg	Intervention cost per mmHg reduction in SBP (Quality of Estimate)
Adair 2013[20] U.S.A.	CHW 10%	1,429 12	$323 (Good)	L, T, CT	−$4,740[c] (Fair)	OP, IP, ED	NR	NR
Allen 2014[21] U.S.A.	CHW 79%	261 12	$299 (Fair)	L	$452 (Fair)	OP, Med	−6.2	$48 (Fair)
Billups 2014[24] U.S.A.	Pharmacist NR	175 6	$219 (Fair)	L	$302 (Good)	OP, IP, ED, Med	−12.5	$17 (Fair)
Dehmer 2016[27] U.S.A.	Nurse, Pharmacist NR	Model 12	$1,002 (Good)	L, T, CT	NR	NA	−8.1	$124 (Good)
Dehmer 2018[28] U.S.A.	Pharmacist 13%	148 12	$1,602 (Good)	L, CT	−$506 (Good)	OP, IP, Med	−9.7	$165 (Good)
Fishman 2013[30] U.S.A.	Pharmacist 21%	261 12	$470 (Good)	L, T	$0 (Good)	OP, IP, ED	−8.9	$53 (Good)
Goetzel 2013[31] U.S.A.	NR NR	8,609 72	NR	NA	−$146 (Fair)	OP, IP, ED, Med	NR	NR
Halladay 2017[32] U.S.A.	Nurse, Nurse Practitioner, Medical Assistant, Informatics Staff, Health Coach 52%	1,238 NA	$65 (Good)	L, T, CT	NR	NA	NR	NR
Henke 2011[34] U.S.A.	NR NR	31,823 Existing Program	$363 (Good)	L, CT	−$684[c] (Fair)	OP, IP, Med	NR	NR
Hollenbeak 2014[35] U.S.A.	CHW, Health Educator 100%	136 6	$857 (Good)	L, T	NR	NA	−6.4	$67 (Good)
Hong 2018[36] U.S.A.	Pharmacist, Dietitian 70%	629 3	$405 (Good)	L, T	NR	NA	−9.0	$45 (Good)
Isetts 2012[39] U.S.A.	Pharmacist, Nurse, Health Coach, Diabetes Educator, Dietitian NR	823 15	NR	NR	−$813[c] (Fair)	OP, IP, Med	NR	NR
Katon 2012[40] U.S.A.	Nurse, Psychiatrist 25%	106 12	$1,481 (Good)	L, CT	$532[c] (Good)	OP, IP	−3.4	$436 (Good)

Study Country	Non-Physician Team Members Percent Non-White Patients	Intervention sample size Intervention duration in months	Intervention cost per patient per year (Quality of Estimate)	Drivers included in intervention cost[a]	Change in healthcare cost per patient per year (Quality of Estimate)	Drivers included in healthcare cost[b]	Change in SBP in mmHg	Intervention cost per mmHg reduction in SBP (Quality of Estimate)
Kulchaitanaroaj 2015a[42] U.S.A.	Nurse, Pharmacist 12%	101 9	$581 (Fair)	L	NR	NA	−15.4	$38 (Fair)
Kulchaitanaroaj 2015b[42] U.S.A.	Nurse, Pharmacist 10%	252 6	$626 (Fair)	L	NR	NA	−10.8	$58 (Fair)
Kulchaitanaroaj 2017[41] U.S.A.	Pharmacist	399 6	$718 (Fair)	L	NR	NA	−12.0	$60 (Fair)
Panattoni 2018[45] U.S.A.	Nurse Practitioner, Pharmacist, Medical Assistant, Health Coach 71%	11,873 NA	$212 (Fair)	L	NR	NA	NR	NR
Polgreen 2015[46] U.S.A.	Pharmacist 54%	401 9	$301 (Fair)	L	NR	NA	−6.1	$37 (Fair)
Prezio 2014[47] U.S.A.	CHW 94%	90 12	$492 (Fair)	L	NR	NA	NR	NR
Reiss-Brennan 2016[48] U.S.A.	Nurse, Medical Assistant, Mental Health Provider 6%	63,396 48	$215 (Fair)	L, CT	NR	NA	NR	NR
Shireman 2016[49] U.S.A.	Pharmacist, Pharmacy Technician 100%	207 6	$243 (Good)	L, CT	NR	NA	−5.6	$44 (Good)
Wagner 2016[54] U.S.A.	Nurse, Medical Assistant, Health Coach, Dietitian 93%	224 12	$543 (Good)	L, T, CT	−$134 (Good)	OP, IP, ED, Med	−8.6	$63 (Good)
Barton 2012[23] U.K.	CHW NA	72 3	$475 (Fair)	L, T	−$167[c] (Fair)	OP, IP, Med	NR	NR
Chan 2012[25] China – Hong Kong	Pharmacist NA	51 9	$102 (Fair)	L	NR	NA	−3.3	$31 (Fair)
Chung 2011[26] China – Hong Kong	Pharmacist NA	150 24	$154 (Fair)	L	NR	NA	NR	NR
Dixon 2016[29] U.K.	Nurse, Health Adviser NA	325 12	$181 (Good)	L, T, CT	−$48 (Fair)	OP, IP, Med	−2.7	$67 (Good)
He 2017[33] Argentina	CHW NA	743 18	$81 (Good)	L, T, CT	−$9 (Fair)	OP, IP, Med	−6.6	$12 (Good)

Study Country	Non-Physician Team Members Percent Non-White Patients	Intervention sample size Intervention duration in months	Intervention cost per patient per year (Quality of Estimate)	Drivers included in intervention cost[a]	Change in healthcare cost per patient per year (Quality of Estimate)	Drivers included in healthcare cost[b]	Change in SBP in mmHg	Intervention cost per mmHg reduction in SBP (Quality of Estimate)
Houle 2012[37] Canada	Nurse, Pharmacist NA	115 12	$135 (Fair)	L	−$198 (Fair)	IP	−5.6	$24 (Fair)
Iles 2014[38] Australia	Nurse NA	120 12	$100 (Fair)	L	NR	NA	NR	NR
Monahan 2019a[43] U.K.	Nurse NA	395 12	$22 (Good)	L, CT	NR	NA	−3.5	$6 (Good)
Monahan 2019b[43] U.K.	Nurse NA	393 12	$60 (Good)	L, CT	NR	NA	−4.7	$13 (Good)
Simpson 2015[51] Canada	Pharmacist NA	131 12	$188 (Fair)	L	−$346 (Fair)	OP, IP, ED, Med	−6.0	$31 (Fair)
Stoddart 2013[52] U.K.	Nurse NA	200 6	$216 (Good)	L, CT	$118 (Good)	OP, IP, Med	−4.3	$50 (Good)
Summary for U.S. studies Median (IQI) Or Frequency	Pharmacist 12; Nurse 9; CHW 4; Dietitian 3; Coach, Counselor, Educator or Adviser 5; Medical Assistant 4; Mental Health Provider 2 Percent Non-White Patients 52% (13% to 79%)	Sample Size 261 (175 to 1,238) Duration 12 (6 to 12)	$438 ($285 to $649) Good 11, Fair 9	L 20, T 7, CT 9	−$140 (−$639 to $226) Good 5 Fair 5	OP 10, IP 9, ED 5, Med 7	−8.8 (−10.5 to −6.2)	$55 ($44 to $66) Good 8 Fair 6
Summary for non-U.S. studies Median (IQI) Or Frequency	Pharmacist 4; Nurse 6; CHW 2; Dietitian 0; Coach, Counselor, Educator or Adviser 1; Medical Assistant 0; Mental Health Provider 0 NA	Sample Size 150 (118 to 359) Duration 12 (8 to 12)	$135 ($91 to $185) Good 5, Fair 6	L 11, T 3, CT 5	−$108 (−$190 to −$19) Good 1, Fair 5	OP 5, IP 6, ED 1, Med 5	−4.5 (−5.7 to −3.5)	$28 ($13 to $36) Good 5 Fair 3
Summary for all studies Median (IQI) Or Frequency	Pharmacist 16; Nurse 15; CHW 6; Dietitian 3; Coach, Counselor, Educator or Adviser 6; Medical Assistant 4; Mental Health Provider 2 NA	Sample Size 257 (135 to 658) Duration 12 (6 to 12)	$299 ($168 to $518) Good 16, Fair 15	L 31, T 10, CT 14	−$140 (−$386 to $30) Good 6, Fair 10	OP 15, IP 15, ED 6, Med 12	−6.3 (−9.0 to −4.9)	$47 ($31 to $62) Good 13 Fair 9

[a] CT, communication tools; L, labor; T, training

[b] ED, emergency department; IP, inpatient; Med, medications; OP, outpatient

[c] Healthcare cost from ‘all causes’ includes costs beyond those for hypertension, CVD risk factors, and CVD.

CHW, community health worker; CVD, cardiovascular disease; SBP, mean systolic blood pressure in millimeters of mercury; IQI, interquartile interval; NA, not applicable; NR, not reported

Table 3.

Summary Economic Outcomes: Net Cost, Return on Investment (ROI), and Cost-effectiveness

Study **Country**	**Non-Physician Team Members** **Percent Non-White Patients**	**Intervention Effectiveness** **Baseline [Change]**[a]	**Change in net cost**[b] **per patient per year (Quality of estimate)**	**Return on Investment (ROI)**[c] **Health systems perspective (Quality of estimate)**	**Net cost per QALY gained** **Time Horizon** **(Quality of estimate)**
Adair 2013[20] U.S.A.	CHW 10%	SBP 129 [NR]; DBP 75 [NR] A1c 7.4 [NR]; LDL 86 [NR]	−$4,417[d] (Fair)	1,370%[d] (Fair)	NR
Allen 2014[21] U.S.A.	CHW 79%	SBP 140 [−6.2]; DBP 83 [−3.1]; A1c 8.9 [−0.5]; LDL 122 [−16]	$751 (Fair)	−250% (Fair)	NR
Billups 2014[24] U.S.A.	Pharmacist NR	SBP 149 [−12.5]; DBP 90 [NR]; A1c NR [NR]; LDL NR [NR]	$520 (Fair)	−240% (Fair)	$3,641 Lifetime (Good)
Dehmer 2016[27] U.S.A.	Nurse or Pharmacist NR	SBP 142 [−8.1]; DBP NR [NR]; A1c NR [NR]; LDL 120 [−11.9]	NR	NR	$3,300 10 years (Good)
Dehmer 2018[28] U.S.A.	Pharmacist 13%	SBP 150 [−9.7]; DBP 83 [−5.1]; A1c NR [NR]; LDL NR [NR]	$1,097 (Good)	−70% (Good)	NR
Fishman 2013[30] U.S.A.	Pharmacist 21%	SBP 152 [−8.9]; DBP 89 [−3.6]; A1c NR [NR]; LDL NR [NR]	$470 (Good)	−100% (Good)	$2,314 Lifetime (Good)
Henke 2011[34] U.S.A.	NR NR	No clinical outcomes reported.	−$321[d] (Fair)	90%[d] (Fair)	NR
Hollenbeak 2014[35] U.S.A.	CHW, Health Educator 100%	SBP 141 [−6.4]; DBP 81 [NR]; A1c NR [NR]; LDL 116 [NR]	NR	NR	$12,897 10 years (Good)
Hong 2018[36] U.S.A.	Pharmacist, Dietitian 70%	SBP 148 [−9]; DBP 86 [−4]; A1c NR [NR]; LDL NR [NR]	NR	NR	$57,078 15 years (Fair)
Isetts 2012[39] U.S.A.	Nurse, Pharmacist, Health Coach, Diabetes Educator, Dietitian NR	No clinical outcomes reported.	NR	NR	NR
Katon 2012[40] U.S.A.	Nurse, Psychiatrist 25%	SBP 136 [−3.4]; DBP NR [NR]; A1c 8.1 [−0.56]; LDL 107 [−9.1]	$2,013[d] (Good)	−140%[d] (Good)	$2,276 2 years (Good)
Kulchaitanaroaj 2017[41] U.S.A.	Pharmacist 14%	SBP 151 [−12]; DBP 87 [NR]; A1c NR [NR]; LDL NR [NR]	NR	NR	$48,856 10 years (Good)

Study Country	Non-Physician Team Members Percent Non-White Patients	Intervention Effectiveness Baseline [Change][a]	Change in net cost[b] per patient per year (Quality of estimate)	Return on Investment (ROI)[c] Health systems perspective (Quality of estimate)	Net cost per QALY gained Time Horizon (Quality of estimate)
Overwyk 2019a[44] U.S.A.	Pharmacist NR	SBP 145 [−8.5]; DBP NR [NR]; A1c NR [NR]; LDL 120 [−8.1]	$73 (Fair)	NR	NR
Overwyk 2019b[44] U.S.A.	Pharmacist NR	SBP 153 [−8.5]; DBP NR [NR]; A1c NR [NR]; LDL 120 [−8.1]	$35 (Fair)	NR	NR
Overwyk 2019c[44] U.S.A.	Pharmacist NR	SBP 153 [−8.5]; DBP NR [NR]; A1c NR [NR]; LDL 119 [−8.1]	$32 (Fair)	NR	NR
Prezio 2014[47] U.S.A.	CHW 94%	SBP 126 [NR]; DBP 78 [NR] A1c 8.2 [−1.1]; LDL 111 [NR]	NR	NR	$43,760 10 years (Fair)
Twiner 2017[53] U.S.A.	HTN Specialist, Nurse Practitioner, Physician Assistant 95%	SBP 151 [NR]; DBP 97 [NR] A1c NR [NR]; LDL NR [NR]	$1,032 (Fair)	NR	$41,245 1 year (Fair)
Wagner 2016[54] U.S.A.	Nurse, Medical Assistant, Health Coach, Dietitian 93%	SBP 158 [−8.6]; DBP NR [NR]; A1c 9.8 [−1.2]; LDL 146 [−27.9]	$408 (Good)	−80% (Good)	NR
Augustovski 2018[22] Argentina	CHW NA	SBP 152 [−5.3]; DBP 92 [−5.1]; A1c NR [NR]; LDL NR [NR]	NR	NR	$3,497 18 months (Good)
Barton 2012[23] U.K.	CHW NA	No clinical outcomes reported.	$308[d] (Fair)	−60%[d] (Fair)	$22,760 1 year (Fair)
Dixon 2016[29] U.K.	Health Adviser, Nurse NA	SBP 148 [−2.7]; DBP 81 [NR]; A1c NR [NR]; LDL NR [NR]	$133 (Fair)	−70% (Fair)	$15,202 1 year (Good)
He 2017[33] Argentina	CHW NA	SBP 152 [−6.6]; DBP 92 [−5.3]; A1c NR [NR]; LDL NR [NR]	$72 (Fair)	−90% (Fair)	NR
Houle 2012[37] Canada	Nurse, Pharmacist NA	SBP 143 [−5.6]; DBP 76 [−2.1]; A1c NR [NR]; LDL NR [NR]	−$63 (Fair)	50% (Fair)	NR
Monahan 2019a[43] U.K.	Nurse NA	SBP 153 [−3.5]; DBP 85 [−1.5]; A1c NR [NR]; LDL NR [NR]	NR	NR	$12,354 10 years (Good)
Monahan 2019b[43] U.K.	Nurse NA	SBP 153 [−4.7]; DBP 86 [−1.3]; A1c NR [NR]; LDL NR [NR]	NR	NR	$27,773 10 years (Good)
Siaw 2017[50] Singapore	Nurse, Pharmacist, Dietitian NA	SBP 129 [−3.8]; DBP NR [NR]; A1c 8.6 [−0.5]; LDL NR [NR]	−$198 (Fair)	NR	NR

Study Country	Non-Physician Team Members Percent Non-White Patients	Intervention Effectiveness Baseline [Change][a]	Change in net cost[b] per patient per year (Quality of estimate)	Return on Investment (ROI)[c] Health systems perspective (Quality of estimate)	Net cost per QALY gained Time Horizon (Quality of estimate)
Simpson 2015[51] Canada	Pharmacist NA	SBP 130 [−6.0]; DBP 75 [−1.0]; A1c 7.0 [−0.02]; LDL 2.4 [−0.02]	−$158 (Fair)	80% (Fair)	$26,184 12 months (Good)
Stoddart 2013[52] U.K.	Nurse NA	SBP 146 [−4.3]; DBP 87 [−2.3]; A1c NR [NR]; LDL NR [NR]	$334 (Good)	−150% (Good)	NR
Summary for U.S. studies Median (IQI) Or Frequency	Pharmacist 10; Nurse 5; CHW 4; Dietitian 3; Coach, Counselor, Educator or Adviser 3; Medical Assistant 2; Mental Health Provider 1 Percent Non-White Patients 70% (18% to 94%)	SBP 149 (140 to 151) [−8.5 (−8.9 to −6.4)] DBP 85 (82 to 89) [−3.8 (−4.3 to −3.5)] A1c 8.2 (8.1 to 8.9) [−0.8 (−1.1 to −0.5)] LDL 120 (112 to 120) [−9.1 (−14.0 to −8.1)]	$439 ($34 to $821) Good 4, Fair 8	−90% (−160% to −30%) Good 4, Fair 4	$12,897 ($3,300 to $43,760) Good 6, Fair 3
Summary for non-U.S. studies Median (IQI) Or Frequency	Pharmacist 3; Nurse 6; CHW 3; Dietitian 1; Coach, Counselor, Educator or Adviser 1; Medical Assistant 0; Mental Health Provider 0 NA	SBP 148 (143 to 152) [−4.7 (−5.6 to −3.8)] DBP 86 (80 to 88) [−2.1 (−3.7 to −1.4)] A1c 7.8 (7.4 to 8.2) [−0.3 (−0.4 to −0.1)] LDL NA	$72 (−$111 to $221) Good 1, Fair 6	−70% (−90% to 20%) Good 1, Fair 5	$18,981 ($13,066 to $25,328) Good 5, Fair 1
Summary for all studies Median (IQI) Or Frequency	Pharmacist 13; Nurse 11; CHW 7; Dietitian 4; Coach, Counselor, Educator or Adviser 4; Medical Assistant 2; Mental Health Provider 1 NA	SBP 148 (141 to 152) [−6.3 (−8.5 to −4.4)] DBP 86 (81 to 89) [−3.1 (−4.6 to −1.8)] A1c 8.2 (7.8 to 8.8) [−0.5 (−1.0 to −0.5)] LDL 119 (109 to 120) [−8.6 (−12.9 to −8.1)]	$133 (−$16 to $495) Good 5, Fair 14	−80% (−130% to 20%) Good 5, Fair 9	$15,202 ($3,569 to $34,509) Good 11, Fair 4

[a] A1c, glycosylated hemoglobin in percent; DBP, diastolic blood pressure in millimeters of mercury; LDL, low density lipoprotein cholesterol in mg/dL; SBP, systolic blood pressure in millimeters of mercury

[b] Net cost = intervention cost + change in healthcare cost

[c] Return on investment (ROI) = (averted healthcare cost – intervention cost)/intervention cost

[d] Healthcare cost from ‘all causes’ includes costs beyond those for hypertension, CVD risk factors, and CVD.

CHW, community health worker; CVD, cardiovascular disease; IQI, interquartile interval; NR, not reported; QALY, quality adjusted life year