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A Systematic Review of Economic Evidence on Community Hypertension Interventions

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Abstract

Context—Effective community-based interventions are available to control hypertension. It is important to determine the economics of these interventions.

Evidence acquisition—Peer-reviewed studies from January 1995 through December 2015 were screened. Interventions were categorized into educational interventions, self-monitoring interventions, and screening interventions. Incremental cost-effectiveness ratios were summarized by types of interventions. The review was conducted in 2016.

Evidence synthesis—Thirty-four articles were included in the review (16 from the U.S., 18 from other countries), including 25 on educational interventions, three on self-monitoring interventions, and six on screening interventions. In the U.S., five (31.3%) studies on educational interventions were cost saving. Among the studies that found the interventions cost effective, the median incremental costs were $62 (range, $40–$114) for 1-mmHg reduction in systolic blood pressure (SBP) and $13,986 (range, $6,683–$58,610) for 1 life-year gained. Outside the U.S., educational interventions cost from $0.62 (China) to $29 (Pakistan) for 1-mmHg reduction in SBP. Self-monitoring interventions, evaluated in the U.S. only, cost $727 for 1-mmHg reduction in SBP and $41,927 for 1 life-year gained. For 1 quality-adjusted life-year, screening interventions cost from $21,734 to $56,750 in the U.S., $613 to $5,637 in Australia, and $7,000 to $18,000 in China. Intervention costs to reduce 1 mmHg blood pressure or 1 quality-adjusted life-year were higher in the U.S. than in other countries.

Conclusions—Most studies found that the three types of interventions were either cost effective or cost saving. Quality of economic studies should be improved to confirm the findings.

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SUPPLEMENTAL MATERIAL

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CONTEXT

Hypertension, a major risk factor for cardiovascular disease (CVD), has an estimated cost of approximately $48.6 billion annually in the U.S.[1] Although awareness of hypertension and its control have been improving, about one in seven adults with high blood pressure are unaware of it.[2] The medication adherence rate remains suboptimal,[2] and 46% of adults with hypertension in 2013–2014 did not have their high blood pressure under control.[2]

Community-based interventions for controlling high blood pressure, such as engaging community health workers in hypertension prevention, team-based care to improve blood pressure control, and screening for high blood pressure, have played a vital role in reducing morbidity and mortality from CVD.[3] From 1980 to 2000, it was estimated that reduction in major risk factors contributed to the 50% reduction in mortality from coronary heart disease (CHD) in the U.S.[4] Although several systematic reviews have shown that many community-based interventions are effective to help improve blood pressure control in the community,[5,6] few reviews have looked at the cost effectiveness and overall economic implications of the programs. Those reviews that summarized economic evidence regarding a particular program, such as team-based care and self-monitoring interventions, did not evaluate the quality of the studies.[7,8]

This study summarizes evidence on cost effectiveness of community-based interventions to control hypertension based on a review of the literature published in the past 2 decades. The authors categorized the evidence by types of interventions and types of health professionals delivering the interventions, and a critical assessment was conducted to evaluate the quality of the studies. Although the review focuses primarily on the evidence of cost effectiveness, studies using all three types of economic methodologies are searched and include cost-effectiveness analysis (CEA); cost–utility analysis (CUA); and cost–benefit analysis (CBA). CEA measures benefit as a single unidimensional outcome (e.g., blood pressure, disease events prevented, and life-years saved). CUA uses health-related quality of life as the only benefit measure, whereas CBA assigns monetary values to healthcare benefits. The evidence can inform policymakers, payers, and practitioners of the economic implications of various interventions for controlling high blood pressure among hypertensive patients in the community.

EVIDENCE ACQUISITION

Literature Search Strategy

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) were applied for this systematic review.[9] Peer-reviewed literature published in English during January 1995 through December 2015 were searched from the databases of PubMed, CINAHL, MEDLINE, EMBASE, EconLit, Cochrane Library, and PsycINFO. Searched key terms included the following:

Interventions—community health worker or community-based or community-based interventions or community-clinical coordination or outreach services or culturally competent services or promoters or community health education;

Study types—cost benefit or cost effectiveness or cost utility or economic evaluation or budget impact analysis;

Study outcomes—hypertension or high blood pressure or diastolic or systolic or quality-adjusted life years or QALYs or life years gained or disability-adjusted life years or DALYs.

Inclusion and Exclusion Criteria

Only studies with an economic evaluation of interventions for hypertension control among hypertensive patients in community rather than clinical settings were included. The following studies were excluded:

1. duplicated literature;
2. articles that were not hypertension related or did not target hypertensive patients;
3. articles that were not CEA, CUA, or CBA;
4. articles with an incomplete economic evaluation of a program or evaluation on the cost for hypertension drugs only;
5. studies that focused on non-community-based interventions such as clinical research, or studies conducted in a particular setting such as worksite or school;
6. review articles and commentaries; and
7. abstract-only articles or conference presentations without a full-text manuscript.

Among 615 articles identified from the literature search that were potentially relevant, 64 articles were selected after applying exclusion criteria 1–5. Two authors independently selected the articles to be included in the review. If the two authors disagreed on whether a study should be included, they discussed it with the third author. After excluding review articles, commentaries, and abstract-only articles, 34 articles met the criteria for this review (Figure 1).

Data Extraction and Synthesis

Selected studies were classified by countries (U.S. versus outside of U.S.); types of interventions; and types of providers. A framework in a Cochrane systematic review study on the effectiveness of hypertension control interventions was used as a reference,[6] and types of interventions were classified into three groups:

1. educational interventions including educational interventions for lifestyle modification, educational interventions for medication adherence, and educational interventions for both lifestyle modification and medication adherence;
2. blood pressure self-monitoring interventions with community assistance; and
3. community-based screening including population-based screening and identification of hypertension cases, combined with intensive treatment of hypertensive patients, and targeted outreach screening with management of identified hypertension cases.

As a secondary classification strategy, the studies were categorized by types of providers who conducted the interventions:

1. physician providers;
2. non-physician providers (including those who practice either in collaboration with or under the supervision of a physician such as nurse practitioners and physician assistants); and
3. both physician and non-physician providers.

Also, the titles of the articles, authors, publication year, intervention setting, study population, study approaches, time horizon, study perspectives, major outcome measures, study quality, main findings, and conclusions of each study were recorded. Quality of each study was assessed according to the Consensus on Health Economic Criteria.[10] The criteria are a set of 19 items to assess the methodologic quality of economic evaluations, developed by experts using a Delphi method.[10] Among the items are research questions, target population, study design, time horizon, economic evaluation perspectives, cost measurement, cost inflation, outcome measurement, cost discounting, outcome discounting, sensitivity analysis, study generalizability, potential conflict of interest, and ethical concerns. Two authors independently assessed the quality of all 34 studies by placing a check mark next to the criterion that the study had met. Group discussions were conducted to settle any disagreement during the process of quality assessment.

The review was conducted in 2016. Incremental cost-effectiveness ratios (ICERs) and net cost savings by country and types of interventions were summarized. ICERs were adjusted to 2014 U.S. dollars using purchasing power parity exchange rates from the World Bank and the consumer price index medical care component from the Bureau of Labor Statistics.[11,12]

EVIDENCE SYNTHESIS

Description of the Literature

Of the 34 selected studies, there were ten studies of educational interventions for lifestyle modification, seven on educational interventions for medication adherence, eight on educational interventions for both lifestyle modification and medication adherence, three on self-monitoring interventions, four on population-based screening interventions, and two on targeted outreach screening interventions. More than half (18 of 34) of the interventions studied were provided by non-physicians such as nurses, pharmacists, dietitians, psychologists, community health workers, medical students, lay health workers, and peer trainers, whereas nine interventions were carried out by physicians and seven were provided by a physician and non-physician collaborative team (Table 1).

In terms of the intervention settings, 21 studies were conducted in communities and 13 were primarily carried out in community health centers or community hospitals. Around two thirds (22 of 34) of the interventions were offered to a large population (>500), whereas the rest focused on a small group with <500 hypertensive patients. The study time horizon was either short term (≤1 year, n=17) or long term (>1 year, n=17). Twelve studies used an RCT design; ten used simulation modeling; and 12 used observational, before-and-after comparison, or other designs to operationalize the analysis. The majority of the studies (n=32) used a healthcare system perspective, analyzing only the program cost and the direct healthcare cost. The other two studies used a societal perspective and included indirect cost such as productivity loss as well. Considerably more studies were published during 2006–2015 (n=25), and nine studies were published in an earlier period of 1995–2005. Sixteen studies were conducted in the U.S. and 18 in other countries including United Kingdom, Canada, China, South Africa, Japan, Pakistan, South Korea, Argentina, Israel, and Mexico (Table 1).

Among the 34 studies, 13 studies applied a CEA using blood pressure change, changes in CHD risk, or life-years gained to measure effectiveness. Eight studies conducted CUA that used quality-adjusted life-years (QALYs) gained or disability-adjusted life-years (DALYs) averted as effectiveness measures. Thirteen studies used CBA, and the study outcomes were monetary values. Three studies applied multiple economic evaluation approaches (Table 2).

Cost-effectiveness Evidence—U.S. Studies

Lifestyle modification—Among the 16 U.S.-based studies, four studies[17,19,20,22] evaluated educational interventions for lifestyle modification, and all the interventions were led by non-physician health professionals. In particular, the two RCT studies[17,19] concluded that the lifestyle education was cost effective, depending on the willingness-to-pay threshold. One observational study[20] showed that an employer-sponsored and Internet-based diet and exercise program was cost saving, and the net savings were $999 per person. Finkelstein and colleagues[22] assessed the Well-Integrated Screening and Evaluation for Women Across the Nation program based on a pre–post study design, and found that it cost $714 to reduce CHD risk by 1% or cost $6,683 to gain 1 life-year (Appendix Table 1, available online).

Medication adherence—Five studies[13,15,16,18,21,23] evaluated educational programs to support anti-hypertensive medication adherence, and all five studies (three pharmacist-led programs, one team-based program provided by physicians and pharmacists, and one physician-led program) concluded that the interventions were cost effective or cost saving. Kulchaitanaroaj et al.[15] conducted a 6-month RCT study for a collaborative care program to provide direct patient education, assessment, and recommendations via phone calls. They reported that this educational intervention cost $40 for a 1-mmHg reduction in systolic blood pressure (SBP) per hypertensive patient, and $103 for a 1-mmHg reduction in diastolic blood pressure. Nuckols and colleagues[16] constructed a probability tree model to assess a physician-led medication management intervention, and reported that it cost $937 for one patient with moderate hypertension to control his or her blood pressure level, and cost $994 for one severe hypertensive patient to reach the goal. The other three studies[18,21,23] on pharmacist-led interventions for medication adherence reported that the net savings of the programs ranged from $109 to $7,299 per patient, depending on the duration and specific elements of the interventions.

Lifestyle modification and medication adherence—Two studies[13,14] assessed educational interventions that combined lifestyle modification and medication adherence, provided by nurses, community health workers, or peer coaches. The two studies found that the combined educational interventions cost from $62 to $114 per patient to reduce 1 mmHg in SBP, and the projected cost would be $13,986 to save 1 life-year in a year.

In general, educational interventions in the U.S. in particular included services to support medication adherence, and were assessed to be either cost saving or cost effective.

Self-monitoring interventions—Three studies[24–26] evaluated self-monitoring interventions in the U.S., using automated blood pressure monitors and followed patients with interactive voice response technologies or with phone calls. All three interventions were provided by non-physician health professionals. Two[24,25] of them showed that the self-monitoring interventions were cost effective. Ritzwoller et al.[24] conducted a 2-year RCT study and intervened high-risk, low-income hypertensive and obese patients with self-monitoring devices, and showed that it cost $727 to reduce 1 mmHg in SBP. The modeling study of Trogdon et al.[25] estimated in a 10-year period that it cost $965 to bring one person's blood pressure under control with self-monitoring of blood pressure. The annual cost for saving 1 life-year was predicted to be $2,337 within the 10 years. Wang and colleagues[26] conducted an RCT and used home blood pressure telemonitoring and telephone-based follow-ups. They found that the difference in costs and effectiveness were not statistically significant between the treatment group and the control group after 18 months. But in subgroup analysis, patients with poor blood pressure control at baseline who received the intervention significantly improved their blood pressure at 18 months.

Screening and treatment—Two studies[27,28] evaluated screening interventions provided by physicians. Eddy et al.[27] examined hypertension case identification and management strategy using an individualized guideline versus the current guideline and found that the net saving of the intervention was $1.84 million based on a modeling approach. Wang and colleagues[28] analyzed screening interventions for high-risk adolescents in the U.S. and found that screening plus high blood pressure treatment was cost effective especially among boys aged ≥15 years (lifetime ICER = $21,734 per QALY among boys and $56,750 per QALY among girls).

Cost-effectiveness Evidence—Studies Outside the U.S

Lifestyle modification—Among the 18 non-U.S.-based studies, six[31,32,35,37,40,41] conducted economic evaluation on educational interventions for lifestyle modification, three of which were provided by physicians and three by non-physician health professionals. All six studies found the interventions were cost saving or cost effective. The interventions cost from $2 (Mexico) to $29 (Pakistan) for a 1-mmHg reduction in SBP. In the United Kingdom, the ICER of the educational intervention for behavior change was $17,215 per QALY.[32] Wang et al.[31] conducted a 1-year RCT study and found that the net savings of a customized, guideline-oriented lifestyle modification intervention was $32 per person in urban areas and $11 in rural areas in China.

Medication adherence—Two studies[39,42] examined the educational interventions to support medication adherence. A United Kingdom–based RCT study[39] found that the intervention, provided by nurse practitioners, was not cost effective. The other study,[42] conducted in South Africa, found the intervention that was led by a physician–pharmacist team was cost saving using a non-experimental design.

Lifestyle modification and medication adherence—Another six studies[29,30,33,34,36,38] evaluated the cost effectiveness of educational interventions for both lifestyle change and medication adherence. All except one found the interventions were cost saving or cost effective. Among the two studies showing the interventions were cost saving, the net savings were estimated at $291 per person in Canada for 1 year and $34,915 per person in Japan for 24 years. Lim and colleagues,[36] however, found that the combined educational intervention was not cost effective when using a more accurate model to estimate the benefit–cost ratio in South Korea.

Screening and treatment—Two studies[43,45] evaluated population-based screening interventions. Gu et al.[43] showed that if physicians would screen all adults aged 35–84 years and treat all identified stage II hypertensive patients in China, it would cost $9,000 per QALY, and was cost effective based on a willingness-to-pay benchmark used in China ($11,900 per QALY). The study of Howard and colleagues,[45] based on those aged 50–69 years in Australia, showed that the hypertension screening and intensive management intervention provided by a physician and non-physician team was projected to cost $613 to save 1 QALY using a lifetime Markov model.

Another two studies[44,46] examined targeted outreach screening interventions carried out by a physician and non-physician team. The study of Yosefy et al.,[46] conducted in Israel, showed that the outreach intervention was cost saving (ICER= −$3,257 per LYS). The study of Zhao and colleagues,[44] based in Australia, showed the outreach intervention in remote communities among indigenous residents aged ≥15 years was cost effective in a 10-year time period (ICER=$1,131–$1,974 per year of life lost if followed up with medium level of primary care and $3,422–$5,637 per year of life lost if followed up with high level of primary care).

Assessing the Quality of the Literature—Based on the 19 criteria items from the Consensus on Health Economic Criteria,[10] the quality of the economic evaluations varied substantially. All 34 studies clearly described the study population, posed a research question in answerable form, appropriately stated the actual study perspective, and appropriately measured the costs and outcomes (Appendix Table 2, available online). Four weaknesses were identified in this literature. First, nearly a third (32%) of the articles did not use an experimental or quasi-experimental design to identify a causal relationship. They either used a pre–post comparison with no control group, or used observational data without appropriate statistical adjustment (e.g., pseudo-randomization with propensity score matching). Second, more than half (53%) of the articles did not appropriately value the costs. Those studies did not conduct discounting or inflation adjustment when their interventions lasted >1 year. Third, in about 44% of the articles, the researchers did not perform sensitivity analyses when there were uncertainties in the study parameters; thus, the robustness of the results was questionable. Finally, only 47% of the studies declared any potential conflict of interest, and only 76% appropriately discussed ethical and distributional issues.

DISCUSSION

In general, the reviewed literature suggests cost-effectiveness research on community-based hypertension interventions has mainly focused on health education interventions, such as promotion of lifestyle change and support for medication adherence. Although the details of the interventions varied significantly, the majority of studies (23 of 25) concluded that educational interventions were cost effective or cost saving. The median ICER of educational interventions in the U.S. was $62 (ranged from $40 to $114) for a 1-mmHg reduction in SBP per hypertensive patient and was $13,986 (ranged from $6,683 to $58,610) for 1 life-year gained. Outside the U.S., educational intervention cost from $0.62 (China) to $29 (Pakistan) for a 1-mmHg reduction in SBP. One in three studies on self-monitoring interventions found the intervention was not cost effective, and all studies on population screening interventions found these interventions were cost effective or cost saving. Also, study findings were not summarized separately for developed and developing countries. Intervention costs to reduce 1 mmHg blood pressure, 1 life-year gained, or QALY were substantially higher in the U.S. than in other high-income countries. Some researchers have suggested that the cost per QALY threshold in the U.S should be $100,000 or $150,000, given that the per capita income in the U.S. is roughly $54,000 and WHO has suggested that a cost-effectiveness threshold be set at three times per capita gross domestic product.[47]

A recent systematic review[7] found that team-based care that consists of patients, primary care providers, and other health professionals to improve blood pressure control was cost effective based on economic results from ten studies. Except for this study, economic evidence for other community-based interventions is largely uncertain in the literature. Other review studies examined only the effectiveness rather than cost effectiveness of community-based hypertension interventions. For instance, a systematic review[5] found that community programs for hypertension prevention could reduce 10-year CVD risk by 0.65% on average, a modest but significantly favorable outcome in CVD risk score. A Cochrane review[6] found that self-monitoring interventions resulted in a moderate reduction in SBP and diastolic blood pressure, and educational interventions did not lead to a large net reduction in SBP. This review study contributed to the literature by reviewing the most up-to-date economic evidence of the common community-based interventions for hypertension control.

More than half of the studies (18 of 34) evaluated the interventions provided by non-physician healthcare practitioners, such as nurse practitioners, pharmacists, dietitians, psychologists, community health workers, peer trainers, and others, whereas the other 16 studies were undertaken by either physicians or physician and non-physician healthcare teams. In general, the findings of cost effectiveness were not greatly influenced by the types of providers. However, because of a limited number of studies, the magnitudes of ICERs cannot be directly compared.

Limitations

Caution should be taken when interpreting these findings given the limitations of the literature. First, half of the studies (17 of 34) evaluated interventions that were less than 1 year in duration. This could be problematic regarding understanding the sustainability and longer-term cost effectiveness of those programs. As the time horizon is usually an important determinant of the ICER of an intervention, results could differ substantially between short-term and long-term study periods of comparison when analyzing the economic implication of interventions on a yearly basis. For instance, Hollenbeak et al.[14] showed that in 6 months, the ICER of the educational intervention was $47 per mmHg reduction in SBP and $453,419 per CHD event avoided. However, in a 10-year time horizon, the ICER was predicted to be only $3,998 per incremental QALY. Second, studies were conducted in various settings and countries that have very different healthcare systems. Specific context would affect the implementation process and health providers' compliance with the intervention protocols. Thus, their findings cannot be generalized to other settings. Finally, many studies did not use an RCT design, nor did they have a control group to do a quasi-experimental analysis. In addition, about 44% of the studies did not take uncertainty into consideration, and sensitivity analyses were not performed. These issues might affect the quality of the literature.

To improve the research quality, a randomized controlled design or a quasi-experimental design with comparable comparison groups should be considered for future studies. Economic modeling and subgroup analysis are better approaches for a comprehensive economic evaluation when person-level information is available. With regard to study perspectives, although the healthcare system perspective is most widely used, a societal perspective can sometimes provide more information about the effects of hypertension control on the society. For example, costs of transportation and informal caregiving are often neglected in the economic studies. Moreover, when cost information includes several years of cost, it is necessary to appropriately inflate or deflate the cost to a chosen year. The same is true of health outcomes. For example, discounting QALYs are often used when the study time horizon is more than 1 year. To confirm the robustness of results, conducting sensitivity analyses is strongly recommended.

Furthermore, a cost-effectiveness benchmark was presented only in nine studies, and 11 others suggested their results were cost effective but did not provide a benchmark. If a prevention strategy is not cost saving, it may be plausible to incorporate a benchmark to inform decision making. For example, the $50,000 cost per QALY is a widely used benchmark value, but it is arbitrary and does not take into account changes over time in purchasing power.[47] Also, researchers examined the cost effectiveness of hypertension control interventions using various health outcomes to measure effectiveness, and this makes it difficult to compare interventions. Future studies can be based on the current evidence and carefully select effectiveness measures. Finally, not all studies specified whether conflicts of interest were present. For example, studies may be funded by the government, research foundations, industries, or other agencies, which potentially convey a conflict of interest. It may be important for researchers to be transparent if there is a conflict.

CONCLUSIONS

This review found that community-based interventions targeting health behavior change and medication adherence were considered cost effective and may even reduce long-term healthcare costs. Community interventions that incorporate non-physician providers, such as community health workers, into the U.S. healthcare system may be favorable from a cost-effectiveness perspective. For example, some states have expanded preventive services provided by community health workers or other non-physician health professionals under Medicaid.[48] Further research may focus on economic evaluations of those innovative service models in a real-world setting to assess their long-term effectiveness and economic implications.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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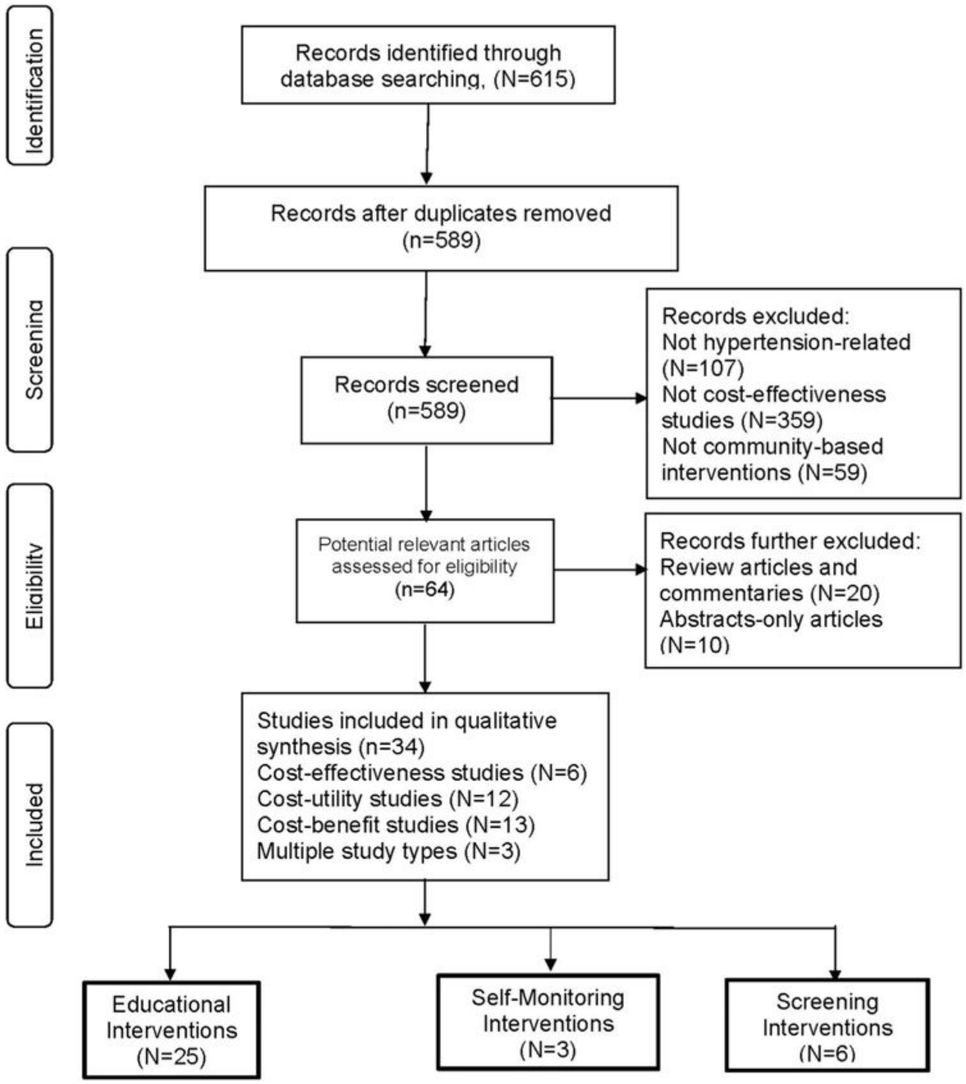

Figure 1.

Selection of cost-effectiveness literature on community-based interventions for hypertension control based on PRISMA flow diagram, 1995–2015.

Note: Searched key words: (1) Interventions: “community health worker” or “community-based” or “community-based interventions” “community-clinical coordination” or “outreach services” or “culturally competent services” or “promoters” or “community health education.” (2) Outcomes: “hypertension” or “high blood pressure” or “diastolic” “systolic” or “Quality adjusted life years” or “QALYs” or “life years gained” or “disability-adjusted life years” or “DALYs” or “adherence to anti-hypertensive medication.” (3) Study type: “Cost-benefit” or “cost-effectiveness” or “cost-utility” or “economic evaluation” or “budget impact analysis.”

Table 1

Main Characteristics of Cost-Effectiveness Studies on Community-Based Interventions for Hypertension Control, 1995–2015 (N=34)

Characteristics	**Studies, *n***
Intervention	
Educational interventions	
Lifestyle modification	10
Medication adherence	7
Lifestyle modification and medication adherence	8
Self-monitoring of blood pressure interventions	3
Screening interventions	
Population-based screening	4
Outreach screening	2
Provider	
Physicians	9
Non-physician providers	18
Both physician and non-physician providers[a]	7
Intervention setting	
Communities	21
Community health centers/hospitals/general practitioners	13
Population size	
Small (≤500)	12
Large (>500)	22
Time horizon	
Short-term (≤ 1 year)	17
Long-term (> 1 year)	17
Study design	
Randomized trial	12
Modeling	10
Others	12
Perspective	
Healthcare system	32
Societal	2
Published period	
1995–2005	9
2006–2015	25
Country	
U.S.	16
Other countries	18

[a]Non-physician providers include nurses, pharmacists, dietitians, psychologists, community health workers, medical students, lay health workers, and peer trainers.

Table 2

Analytic Approaches and Major Outcome Measures Used in the Studies of Cost-Effectiveness of Community-Based Interventions for Hypertension Control, 1995–2015 (N=34)

	CE				
Author, Year, Country	Blood pressure	CHD event/risk	LYS	CB, Monetary benefit	CU, QALY/DALY
U.S.-based studies					
Educational Interventions					
Allen et al. (2014)[13]	✓				
Hollenbeak et al. (2014)[14]	✓	✓	✓		✓
Kulchaitanaroaj et al. (2012)[15]	✓				
Nuckols et al. (2011)[16]	✓[a]				
Datta et al. (2010)[17]			✓		
Johannigman et al. (2010)[18]				✓	
Troyer et al. (2010)[19]					✓
Sacks et al. (2009)[20]				✓	
Bunting et al. (2008)[21]				✓	
Finkelstein et al. (2006)[22]		✓	✓		
Munroe et al. (1997)[23]				✓	
Self-monitoring interventions					
Ritzwoller et al. (2013)[24]	✓				
Trogdon et al. (2012)[25]			✓		
Wang et al. (2012)[26]				✓	
Screening interventions					
Eddy et al. (2011)[27]				✓	
Wang et al. (2011)[28]					✓
Non-U.S. studies					
Educational interventions					
Gaziano et al. (2014),[29] South Africa					✓[c]

Author, Year, Country	CE			CB, Monetary benefit	CU, QALY/DALY
	Blood pressure	CHD event/risk	LYS		
Bai et al. (2013),[30] China	✓				
Wang et al. (2013),[31] China				✓	
Barton et al. (2012),[32] UK					✓
Houle et al. (2012),[33] Canada				✓	
Yamagishi et al. (2012),[34] Japan				✓	
Jafar et al. (2011),[35] Pakistan	✓				✓[c]
Lim et al. (2011),[36] South Korea				✓	
Perman et al. (2011),[37] Argentina			✓		
Huang and Ren (2010),[38] China				✓	
Schroeder et al. (2005),[39] UK				✓	
Yosefy et al. (2003),[40] Israel					✓
Garcia-Pena et al. (2002),[41] Mexico	✓				
Edwards et al. (1998),[42] South Africa				✓	
Screening interventions					
Gu et al. (2015),[43] China					
Zhao et al. (2014),[44] Australia			✓		
Howard et al. (2010),[45] Australia					✓
Yosefy et al. (2003),[46] Israel			✓		
Total[b]	8	2	7	13	8

[a]This study assessed the percentage of attaining the blood pressure control goal.

[b]The total does not add up to 34 because three studies assessed multiple outcomes.

[c]This study used DALY instead of QALY.

CB, cost-benefit analysis; CE, cost-effectiveness analysis; CHD, coronary heart disease; CU, cost–utility analysis; DALY, disability-adjusted life-years; LYS, life-year saved; QALY, quality-adjusted life-years.