Training providers in hypertension guidelines: Cost-effectiveness evaluation of a continuing medical education program in South Carolina

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Background Translation of published guidelines to clinical practice through continuing medical education (CME) can be effective at changing provider practice patterns and patient outcomes. Yet, cost-effectiveness analyses of CME interventions are rare. This study analyzed the cost-effectiveness of a CME program for improving patient hypertension outcomes relative to usual care.

Methods A CME, conducted by the Carolinas and Georgia chapter of the American Society of Hypertension, the Medical University of South Carolina, and the Heart Disease and Stroke Prevention Division of the South Carolina Department of Health and Environmental Control, trained primary care providers in evidence-based guidelines for hypertension prevention and control. A cost-effectiveness simulation model was created with inputs from primary data collection of program costs and secondary data analysis of the Hypertension Initiative Database for years 2000 through 2008. The data analysis consisted of a convenience sample of 8,183 patients in the Hypertension Initiative Database who saw a CME-trained provider at least once before and after the provider's training. Control patients saw providers who did not attend a CME program and were matched to CME patients using propensity score matching.

Results Incremental life-years gained (LYG) for CME compared with no intervention were 0.003 per patient. The incremental cost-effectiveness ratio was $39,494 ($19,184-$73,864) per LYG under optimistic assumptions and $54,755 ($32,423-$95,728) per LYG under pessimistic assumptions. These results were most sensitive to changes in the effectiveness of the intervention on systolic blood pressure.

Conclusions The intervention is likely a cost-effective strategy to address hypertension in a real-world setting and can serve as a model for future innovations in hypertension prevention. (Am Heart J 2011;162:786-793.e1.)

Hypertension affects 29% of adults aged 18 and older in the United States.[1] Recent data indicate that only 50% of all hypertensive individuals and 51% of treated hypertensive patients have their blood pressure under control.[2] Thus, there is considerable opportunity for improvements in hypertension prevention and control.

Nationally, only 65% of patients receive recommended best-practice preventive care.[3] Translation of published guidelines to clinical practice through continuing medical education (CME) can be effective at changing provider practice patterns and patient outcomes.[4,5] However, cost-effectiveness analyses of CME interventions are rare.[5,6]

This study analyzed the cost-effectiveness of a collaborative hypertension intervention conducted by the Carolinas and Georgia chapter of the American Society of Hypertension (ASH), the Medical University of South Carolina (MUSC), and the Heart Disease and Stroke Prevention Division of the South Carolina Department of Health & Environmental Control (SC DHEC). The intervention provided CME to train primary care providers in evidence-based guidelines for hypertension prevention and control. Using data on program costs and effectiveness measures from the Hypertension Initiative Database (HID),[7] this study modeled the intervention's cost-effectiveness relative to no intervention.

Continuing medical education program

The CME program aims to (1) raise awareness of the epidemiology of hypertension and feasibility of

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improving control, (2) educate providers about evidence-based guidelines and clinical trials that can positively impact daily practice, (3) facilitate participation in a community practice network and HID, and (4) encourage providers to become clinical hypertension specialists.[7] The locations for the CME trainings are chosen to target areas with high age-adjusted mortality rates for hypertension, diabetes, stroke, and end-stage renal disease.

The training, led by 2 to 3 hypertension specialists, is a few hours. Average attendance is 22 primary care providers per session. Because the locations change, most providers only attend 1 program in our data. Program topic areas include clinical epidemiology, patient evaluation/assessment, initial therapy, combination therapy, compelling evidence, special populations, diabetic patients, patients with stroke and myocardial infarction, cardiometabolic syndrome, and secondary causes of hypertension.

Methods

Data collection

Site visit. A site visit was conducted to collect program cost information using activity-based costing, which assesses labor, materials, and contracted costs required to provide each primary activity. The 4 activities of the CME program were development of materials, recruitment of participants, conducting the training sessions, and administration. Development costs included creation of the curriculum. Recruitment costs included identification of host sites and promotion of the event. Training costs included travel and stipends for the faculty, room rental or in-kind donation, and handout materials. Administration costs included management of contracts, attendee lists, and evaluation of provider comment forms.

Hypertension initiative database. The HID collects data on patient demographics, vital signs, diagnoses, medications, and laboratory values from participating ASH members.[7] We evaluated HID data from 2000 through early 2008, representing 1.4 million patients. The data included 110 providers who attended 1 of 21 CME programs that occurred between November 2003 and October 2007.

Providers, if not already participating, were invited to join the HID at the CME training. However, not all providers who attended CME trainings contributed to the HID. In the HID, the average number of providers per CME training was 5.24. Thus, approximately 24% (5/22) of all attendees of the CME trainings were represented in the HID. Using this ratio, an estimated 462 (110/0.24) providers attended the 21 CME trainings captured in the HID, of which 352 did not participate in the HID.

To correctly measure the cost per patient for the intervention, it was crucial to determine the total number of patients affected by the CME program, which we estimated under 3 different assumptions. The pessimistic assumption was that no patients outside the HID were affected by providers' CME. The optimistic assumption was that CME providers who did not join the HID served as many patients just as effectively as CME providers who joined the HID. Given the high rates of electronic medical record use among HID participants and the positive relationship between practice size and electronic medical record adoption,[8] it is unlikely that the number of patients per CME provider outside the HID was larger than participating providers. Finally, the midpoint assumption was that CME providers outside the HID saw half as many patients but treated them as effectively as CME providers in the HID (Table I).

Table I. Estimated number of patients affected by providers' CME

Assumed ratio of patients per CME provider outside HID to patients per CME provider in HID	Estimated no. of total patients affected
Pessimistic (ratio = 0)*	8183
Midpoint (ratio = 0.5)	21276
Optimistic (ratio = 1)†	34369

* Assumes that no patients outside the HID were affected by providers' CME.
† Assumes that CME providers who did not join the HID served as many patients as effectively as CME providers who joined the HID.

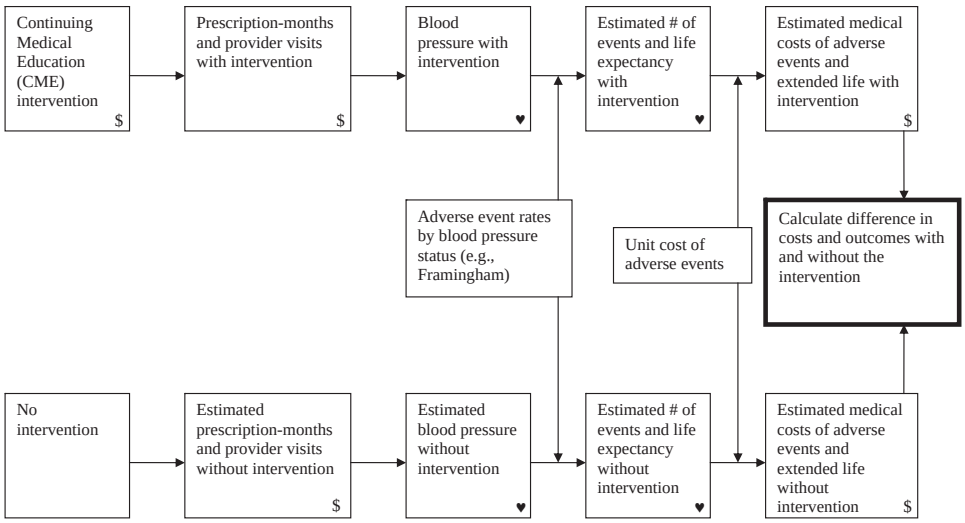
Cost-effectiveness model

We use a simple, static cost-effectiveness model from a payer's perspective with a 2-year and 10-year time horizon. Figure 1 summarizes the steps used to construct the cost-effectiveness model. The data included the implementation costs of the intervention, the number of antihypertension prescriptions written for the patients of providers who attended the CME (CME patients) and participated in the HID, provider visits among the CME patients in the HID, and clinical data, including blood pressure, for CME patients before and after their provider attended the CME. These are the first 3 boxes from left to right on the top row of Figure 1.

Prescriptions, provider visits, and blood pressure without the intervention. We used the HID and a case-control/pre-post design to estimate what antihypertensive prescriptions, provider visits, and blood pressure rates would have been among CME patients in the absence of the intervention.[9] Continuing medical education patients were matched to control patients, patients of providers who did not attend a CME program, with similar baseline characteristics using propensity score matching.[10] We then compared the changes in blood pressure, prescriptions, and provider visits between the 2 years before (pre) and 2 years after (post) the providers' CME date among the CME patients with the changes in the same variables among the control patients. The difference in the changes between the CME patients and the control patients was the estimated effect of the CME intervention (Table II). Additional details are available in Allaire et al.[9]

Estimated number of adverse events. The second step was to estimate the number of adverse events (acute myocardial infarction [AMI], stroke, congestive heart failure [HF], and renal failure) and life expectancy among CME patients. These events represent the main risks that hypertension poses.[11] Event rates for AMI, stroke, and HF in the absence of the intervention were from a Framingham calculator that has been shown to be sensitive to systolic blood pressure (SBP).[12,13] The probability of an event was predicted within 2 years and

Figure 1



Steps used to construct the cost-effectiveness model.

Table II. Program effectiveness: CME patients (n = 8,183) versus matched control patients*

Measure	Group	Pre-CME†	Post-CME	Difference
SBP	CME patients	131.52	129.58	−1.94
	Control patients	131.54	131.59	0.05
	Effect of CME			−1.99‖
	95% CI‡			(−2.73 to −1.25)
Diastolic blood pressure	CME patients	77.12	75.68	−1.44
	Control patients	77.16	77.20	0.04
	Effect of CME			−1.49‖
	95% CI			(−1.92 to −1.06)
No. of provider visits	CME patients	4.65	5.84	1.19
	Control patients	5.93	5.34	−0.59
	Effect of CME			1.78‖
	95% CI			(1.39 to 2.17)
No. of hypertension prescription-months§	CME patients	0.48	0.58	0.10
	Control patients	0.35	0.28	−0.07
	Effect of CME			0.16
	95% CI			(−0.23 to 0.55)

* Continuing medical education patients had at least 1 blood pressure reading both pre- and post-CME date with the same CME trained provider. Control patients saw providers who did not attend a CME program and were matched to CME patients using propensity score matching.
† Figures represent mean measures 2 years before (pre) and 2 years after (post) CME date.
‡ The SEs were clustered at the patient level. In sensitivity analysis, the effects of the CME program on blood pressure (systolic and diastolic), number of provider visits, and number of prescription months were assumed to have a normal distribution with a mean equal to the point estimate and an SD equal to the SE.
§ Sample restricted to patients with complete start and end dates for prescriptions: CME patients (n = 4,728) and their matched controls.
‖ Estimate significant at the 95% CI.

within 10 years. Inputs were defined to hold all inputs at average pre-CME levels for our CME patients.

The Framingham calculator does not predict the probability of HF or renal failure. As a proxy for the probability of HF, we used the probability of cardiovascular disease (CVD) less the sum of the probabilities of coronary heart disease and stroke from the Framingham calculator, which includes both HF and peripheral vascular disease. Because it is not clear how accurately risk calculators such as Framingham track changes in risk resulting from changes in input risk factors,[14] event rates for AMI, stroke, and HF with the CME intervention were calculated by adjusting the baseline Framingham probabilities using the estimated relationship between change in SBP and the odds of each outcome.[15] Event rates for renal failure by blood pressure level were based on the Multiple Risk Factor Intervention Trial (Figure 2 from Klag et al[22]). Assuming that the annual event rate was constant, the t-year rate ($t > 1$) was calculated as $1 - (1 - \text{one-year rate})^t$.[23]

Lowering blood pressure will prevent adverse events, extend life, and lengthen the time horizon that people incur health care

Table III. Medical costs (2007 $)*

Event	Cost per event	Source
First year of AMI (nonfatal)	24782	Russell et al[16]
First year of stroke	33514	Flack et al[17]
First year of congestive HF	7090	Flack et al[17]
Average annual costs of renal failure	65388	U.S. Renal Data System[18]
Prescription claim (30 d)	64.61 (20.89-108.33)	Red Book[19]
Provider visit	41.90 (19.81-63.99)	Centers for Medicare and Medicaid Services[20]
Average annual medical costs (age 65 and older)	9080	Agency for Healthcare Research and Quality[21]

*In sensitivity analysis, all medical event costs were assumed to have a log normal distribution. The distributions were parameterized so that the expected value in levels is equal to the value in the table and the SD on the log scale is 0.2 for AMI, stroke, HF, renal failure, and average annual medical costs. Prescription drug claims and visit costs were assumed to have a triangular distribution with the point estimate as the most likely value and the minimum and maximum values given by the range.

expenditures. Although still an unresolved issue in cost-effectiveness analysis, economists recommend that these costs be included.[24] We calculated life-years gained (LYGs) resulting from the reductions in CVD and renal failure risk described above.[25] We converted a percentage reduction in CVD (renal failure) death from lower blood pressure into a percentage reduction in all-cause death, assuming other causes of death remain constant. Life tables were then used to calculate life expectancy, from the start of the intervention, under the reduction in all-cause mortality. The difference between life expectancy with and without the reduction in mortality caused by the intervention yielded LYG. The calculation of LYG is described in detail in the online Appendix.

Average medical cost per event. The third step was to multiply the number of adverse events by the average cost for each event to estimate the total medical costs of events, again with and without the intervention. Average medical costs for the first year of each event were taken from recent published literature, with a preference for those used in previous cost-effectiveness analysis (Table III). The Red Book provided an annual market share weighted average of name brand medicines for hypertension.[19] The Food and Drug Administration reported that with 10 generic brands available, average retail prices of generics were approximately 20% of the branded price. We assumed an average price for hypertension medication at the midpoint of the full branded price and the estimated generic price, yielding a price equal to 60% of the full branded price.[26] All medical costs were updated to 2007 dollars using the medical care current price index.[27]

To discount event costs back to the present value, for models with a 10-year time horizon, we assumed that any events occurred at 5 years. The costs for prescription drugs and provider visits were the present value of cumulative 10-year costs. Medical costs for extended life were calculated by multiplying LYGs by average annual medical expenditures for ages 65 and older from the Medical Expenditure Panel Survey.[21] All costs were discounted back to present value using a discount rate of 3%.

Finally, incremental costs were the difference in costs (implementation plus medical) between those patients with and without the intervention. Incremental effectiveness was the difference in the number of adverse events and LYGs with and without the intervention. Because we do not have long-term follow-up data and therefore do not know how long the benefits of the intervention last, we report results assuming that the improvements in blood pressure from the intervention are maintained for 2 and 10 years.

Sensitivity analysis. In probabilistic sensitivity analyses, the effects of the CME program on blood pressure (systolic and diastolic), number of provider visits, and number of prescription-months were assumed to have a normal distribution with a mean equal to the point estimate and a SD equal to the SE; all medical event costs were assumed to have a log normal distribution, and prescription drug claims and visit costs were assumed to have a triangular distribution (Table III). Using TreeAge Pro software (TreeAge Software, Inc., Williamstown, MA),[28] incremental cost-effectiveness ratios (ICERs) were calculated for 10,000 random, jointly drawn sets of these key parameters. The ICER between the 2.5th and 97.5th percentiles of the generated ICER distribution are reported as the 95% sensitivity range. We also report cost-effectiveness acceptability curves that show the fraction of all simulations for which the ICER is below specified willingness to pay per LYG.

Furthermore, to see how much of the variation in the ICERs was caused by the estimated effect sizes, we varied each of the estimates for the effect of the CME separately. The effect sizes were estimated for the average patient of the CME provider with ranges equal to the point estimate ±2 SE (see Table II). There could be subsets of patients, such as those with uncontrolled hypertension, where the cost-effectiveness of the CME program differs. We performed 2-way sensitivity analysis to illustrate how the ICER varies with baseline SBP. We report ranges of SBP and the effect of the CME where the ICER is less than $50k/LYG and $100k/LYG, a suggested range for thresholds for medical interventions.[29]

The authors are solely responsible for the design and conduct of this study, all study analyses, the drafting and editing of the manuscript, and its final contents.

Results

On average, the total cost per CME event was $20,295, including all materials, contract, and labor costs to both ASH and DHEC (Table IV). The 2 largest parts of program costs were stipends for faculty presenters ($4,287) and labor for the education coordinator ($8,063).

Assuming that the effects of the intervention applied only to the CME patients captured in the HID (pessimistic, n = 8,183) and were maintained 2 years, the incremental cost of the intervention per patient was $142 (Table V). Incremental cost per patient included a savings of $15 for CVD and renal events, $71 for additional provider visits, $52 for the CME program, $24 for other medical care associated with LYG, and $10 for additional prescriptions. Under the assumption that CME providers not joining the HID served as many patients as effectively as CME providers who joined the

Table IV. Continuing medical education program costs per CME event*

	Development†	Recruitment	Trainings	Admin.	Total
Labor					
Health systems coordinator	35	35		105	175
Education coordinator			8063		8063
Administrator				1260	1260
Subtotal					9498
Materials/supplies					
Audio/visual			402		402
Catering			831		831
Printed materials			1686		1686
Room rental			503		503
Announcements and invitations		277			277
T-shirts		242			242
Subtotal					3941
Contract services					
Administration				2237	2237
CME processing			81		81
Faculty honoraria			4287		4287
Travel/lodging			250		250
Subtotal					6855
Total	35	554	16104	3601	20295
				SD =	(3248)

* Program costs include Heart Disease and Stroke Prevention Division of the SC DHEC and Carolinas and Georgia chapter of the ASH expenditures. Costs collected for CME programs from January 2005 through June 2007 (n = 13) and reported in 2007 $.
† Development and administration costs are fixed costs. Recruitment and trainings are variable costs.

Table V. Incremental cost-effectiveness ratios relative to usual care (95% sensitivity range)*

Scenario (no. of patients affected)	Incremental cost per patient	Incremental effectiveness per patient (LYG)†	Incremental cost effectiveness ratio ($/LYG)
Pessimistic (n = 8183)			
Two-year	$142 ($92-$198)	0.003 (0.002-0.004)	$54755 ($32423-$95728)
Ten-year	$437 ($207-$690)	0.015 (0.009-0.021)	$28465 ($12868-$53985)
Midpoint (n = 21276)			
Two-year	$110 ($60-$166)	0.003 (0.002-0.004)	$42429 ($21794-$78046)
Ten-year	$405 ($175-$658)	0.015 (0.009-0.021)	$26377 ($10896-$51116)
Optimistic (n = 34369)			
Two-year	$103 ($52-$159)	0.003 (0.002-0.004)	$39494 ($19184-$73846)
Ten-year	$397 ($167-$650)	0.015 (0.009-0.021)	$25880 ($10429-$50347)

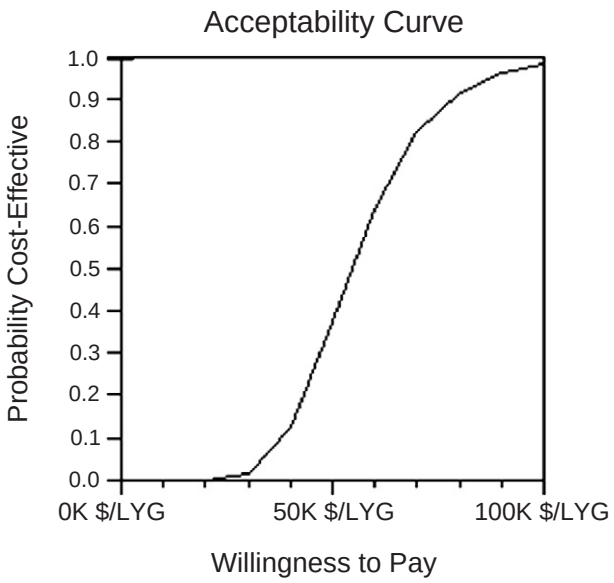
LYG, Life-years gained.
* In sensitivity analysis, the effects of the CME program on blood pressure (systolic and diastolic), number of provider visits, and number of prescription months as well as all medical costs (see Table III) were simulated with 10,000 draws from their respective distributions. The ICER between the 2.5th percentile and 97.5th percentile of the generated ICER distribution are reported as the 95% sensitivity range. All results are for the average patient of a CME provider.

HID (optimistic, n = 34,369), the incremental cost per patient was $103. In 2 years, 0.003 life-years per patient were gained, or between 24.5 (pessimistic) and 103.1 (optimistic) total life-years in the affected patient population. The ICER for the intervention compared with no intervention was $54,755 per LYG under the pessimistic number of patients affected and $39,494 under the optimistic. In probabilistic sensitivity analysis of the pessimistic model with 2-year time horizon, 37% of the simulations had ICER below $50k/LYG (Figure 2). Ninety-eight percent of the simulations had ICER below $100k/LYG.

If the effects of the intervention were maintained for 10 years (without additional program costs for extra CME trainings), the ICERs improved. The incremental cost of the program was higher through 10 years because of the ongoing costs of increased provider visits and higher medical costs for extended life. The 10-year incremental effectiveness was 0.015 LYG per patient. Relative to no intervention, the 10-year ICER was between $28,465 per LYG (pessimistic) and $25,880 per LYG (optimistic).

In 1-way sensitivity analysis, the model with a 2-year time horizon was most sensitive to the parameters governing the effect of the intervention on SBP (spread = $40k/LYG to $91k/LYG), the effect on the change in prescriptions (spread = $41k/LYG to $70k/LYG), and the change in the number of provider visits (spread = $46k/

Figure 2



Acceptability curve.

LYG to $64k/LYG) (Figure 3). Because diastolic blood pressure only affected the probability of renal failure, the results were insensitive to variation in the effect size for diastolic blood pressure. Two-way sensitivity analysis showed that over the range of initial SBP from 120 to 180 mm Hg, ICER was less than $50k/LYG for all effect sizes greater than approximately a 2-point decrease in SBP (Figure 4).

Discussion

Cost-effectiveness analyses of CME interventions are rare.[5,6] This study is one of the first to evaluate the cost-effectiveness of CME for improving patient blood pressure. The collaborative CME intervention between ASH, MUSC, and SC DHEC is likely a cost-effective approach for reducing CVD risk among patients of primary care providers.

The reductions in blood pressure were comparable with the effects of provider-recommended lifestyle changes, such as reducing dietary sodium and dietary fiber supplementation,[30] and other CME programs.[9,31] The cost-effectiveness ratios are similar to those reported for pharmacologic hypertension therapies and lifestyle interventions.[19,32]

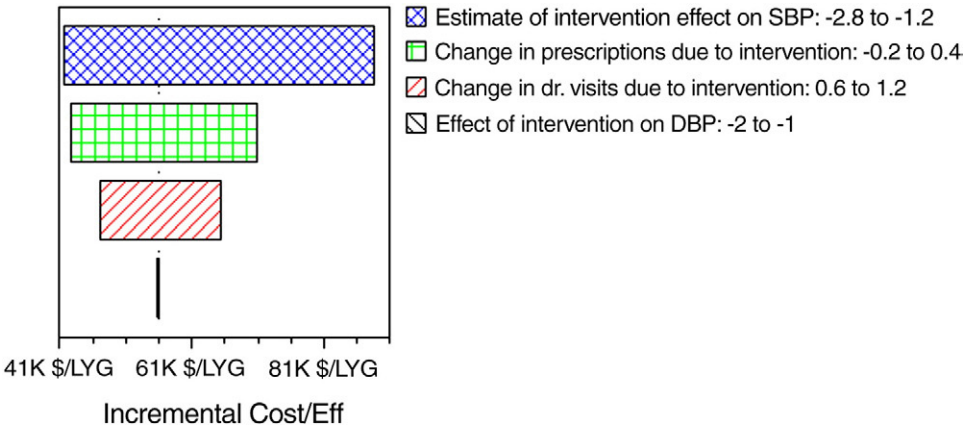
The model was sensitive to key modeling assumptions and parameter estimates. The most important parameter in the model was the effect of the intervention on SBP. The effect size used in the model (−2 mm Hg) was the average impact for all CME patients, including those with normal blood pressure. Results reported elsewhere showed that the effect of the intervention among patients with uncontrolled hypertension were even larger.[9] The 2-way sensitivity analysis showed that larger effect sizes would improve the ICER considerably.

The 95% sensitivity ranges were often wide, especially for the 10-year time horizon. The 2-year horizon assumed that the gains were lost after only a few provider visits, a conservative assumption. The 10-year results, even if unlikely, illustrated how important maintenance of hypertension control can be: even at 2 years, an ICER of $42,000 per LYG (the midpoint estimate) compares favorably with other prevention and medical interventions. Ultimately, whether the ICER is acceptable depends on the willingness to pay for an additional year of life, which can vary across decision makers.

Several features of the intervention were critical to its success. The partners reported that the ability to pool resources was integral to maintaining the program. Participants reported that reduced travel time, targeted topics, and the case study discussions increased their participation and learning. Feedback, such as the HID quarterly provider reports, has been shown to be effective in implementing guidelines.[5]

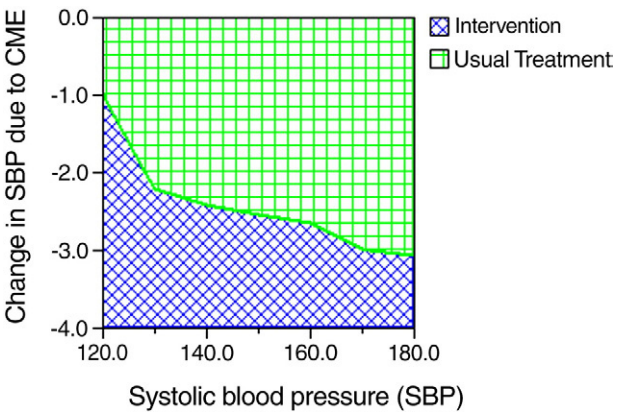
Several limitations can be noted with this analysis. First, the ICERs are relative to no intervention and do not provide a comparison with other possible interventions. Second, the gold standard for effectiveness measurement is a randomized control trial. The observed improvement in blood pressure among patients of CME-trained providers in the HID could be at least partly caused by selection bias (ie, providers who voluntarily joined the HID could be top performers who would have generated above-average improvement in blood pressure without the intervention). However, the control patients were also drawn from providers who voluntarily contributed to the HID, mitigating some of the potential bias. Furthermore, the pessimistic model assumed that no patients outside the HID received any benefit from the intervention, removing the risk of applying upwardly biased effect sizes to non-HID providers' patients. Third, the effect of changes in SBP on cardiovascular risk was based on antihypertensive drug trials. It is not yet known how the benefits from similar reductions in SBP from lifestyle changes would compare. Fourth, because the specific topic areas were selected by the host, replicability might be problematic. Fifth, the costs of events did not include long-term care costs; the savings in medical costs from events avoided because of the intervention would have been even larger had long-term care costs been included. Finally, LYG does not capture changes in morbidity because of the CME as quality-adjusted life-years would.

Figure 3



One-way sensitivity analysis.

Figure 4



Two-way sensitivity analysis. The crosshatched area shows combinations of the change in SBP because of the CME and initial SBP for which the ICER is less than $50k/LYG.

Conclusions

The intervention conducted by ASH, MUSC, and SC DHEC is likely a cost-effective strategy to lower blood pressure and potentially reduce CVD in a real-world setting. It is essential to collect program effectiveness and cost data to support evidence-based strategies to improve hypertension control. Given the low rates of hypertension control in the United States,[33] it is imperative to promote improved hypertension control through successful programs and partnerships. This intervention partnership can serve as a model for future innovations in hypertension prevention.

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Appendix. Calculating LYGs

This appendix outlines the procedure for converting reduction in the risk of CVD death into LYGs. We use disease-specific mortality rates and life expectancy tables from the *2004 National Vital Statistics Report* to identify baseline inputs used to calculate changes in life expectancy resulting from CVD risk reduction.[34,35] Cardiovascular disease deaths are the sum of deaths from diseases of the heart and cerebrovascular diseases. Table B-1 shows an example calculation for 10-year CVD risk reduction for a 45-year-old woman.

Baseline inputs:

1. Use disease-specific mortality rates by age and sex (eg, women of all races aged 45-54 years) from the *2004 National Vital Statistics Report* to determine baseline[34]:
   a. Rate of CVD deaths (eg, 62.7 deaths per 100,000 people)
   b. Number of CVD deaths (eg, 13,287 deaths)
   c. Rate of total deaths (eg, 314.18 deaths per 100,000 people)
2. Use life expectancy tables for men and women from the *2004 National Vital Statistics Report* to determine baseline[35]:
   a. Conditional probability of dying between age *t* and age *t + 1* (eg, 0.224%)
   b. Conditional life expectancy for a median age person (eg, 37.23 years)

Follow-up calculations:

A. Calculate percentage reduction in 10-year CVD risk from baseline to follow-up.
B. Calculate rate of CVD deaths at follow-up by reducing baseline rate of CVD deaths (input 1a) by the percentage reduction in 10-year CVD risk (A).
C. Calculate the number of CVD deaths at follow-up resulting from the reduction in the rate of CVD deaths (B).
D. Calculate change in the number of CVD deaths from baseline to follow-up by subtracting the number of CVD deaths at baseline (input 1b) from the number of CVD deaths at follow-up (C).
E. Calculate rate of total deaths at follow-up (input 1c) by reducing the baseline rate of total deaths by the change in the number of CVD deaths (D).
F. Calculate percent reduction in rate of total deaths from baseline to follow-up.
G. Calculate conditional probability of dying between age *t* and age *t + 1* at follow-up by reducing baseline probability (input 2a) by percentage reduction in rate of total deaths (F).
H. Apply the reduction in the probability of death (G) to each year of life beginning at the median age for the age group through the number of years of the intervention (ie, 1 or 10). Calculate conditional life expectancy for a median-age person at follow-up based on the reduction in probability of death (G).
I. Calculate gain in life expectancy by subtracting life expectancy at baseline (input 2b) from life expectancy at follow-up (H).
J. Discount gain in life expectancy (I) at 3% over average follow-up life expectancy (H).

Table B-1. Life expectancy calculations: 10-year CVD risk reduction for a 45-year-old woman

	Baseline (1)	Follow-up (2)	Change from baseline to follow-up (3)
Rate of CVD deaths per 100000	62.70	50.16 (B)	–20.0% (A)
No. of CVD deaths	13278	10622 (C)	–2656 (D)
Rate of total deaths per 100000	314.18	301.64 (E)	–4.0% (F)
Probability of dying between ages 45 and 46	0.224%	0.215% (G)	–4.0%
Conditional life expectancy at age 65 in years	37.23	37.27 (H)	0.04 (I)
Discounted gain in life expectancy in years			0.01 (J)

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