

Economic Analysis of a Randomized Trial of Academic Detailing Interventions to Improve Use of Antihypertensive Medications

Steven R. Simon, MD, MPH;¹ Hector P. Rodriguez, MPH, PhD;¹ Sumit R. Majumdar, MD, MPH;^{1,2} Ken Kleinman, ScD;¹ Cheryl Warner, MD;³ Susanne Salem-Schatz, ScD;⁴ Irina Miroshnik, MS;¹ Stephen B. Soumerai, ScD;¹ Lisa A. Prosser, PhD¹

The authors estimated the costs and cost savings of implementing a program of mailed practice guidelines and single-visit individual and group academic detailing interventions in a randomized controlled trial to improve the use of anti-hypertensive medications. Analyses took the perspective of the payer. The total costs of the mailed guideline, group detailing, and individual detailing interventions were estimated at \$1000, \$5500, and \$7200, respectively, corresponding to changes in the average daily per person drug costs of -\$0.0558 (95% confidence interval, -\$0.1365 to \$0.0250) in the individual detailing intervention and -\$0.0001 (95% confidence interval, -\$0.0803 to \$0.0801) in the group detailing intervention, compared with the mailed intervention. For all patients with incident hypertension in the individual detailing arm, the annual total drug cost savings were estimated at \$21,711 (95%

confidence interval, \$53,131 savings to \$9709 cost increase). Information on costs of academic detailing could assist with health plan decision making in developing interventions to improve prescribing. (J Clin Hypertens. 2007;9:15–20)

©2007 Le Jacq

Educational outreach, also called academic detailing,¹ has been consistently demonstrated to be effective in improving physicians' prescribing.² Academic detailing involves the use of trained "detailers" (usually physicians or clinical pharmacists) conducting face-to-face visits with prescribers to encourage adoption of a desired behavior pattern (eg, use of guideline-recommended medications). Although academic detailing is perhaps the most effective intervention studied to improve prescribing behavior,² it has not been widely adopted, largely because of the general perception that the costs of a face-to-face intervention are prohibitively high. To offset these perceptions, one modification of academic detailing that has been infrequently studied is that of group detailing—an effort to incorporate the principles of academic detailing in small group sessions that are designed to improve practice while putatively decreasing both the efforts and costs related to traditional one-on-one detailing.^{2–7}

Hypertension is one of the most common and costly conditions treated by primary care physicians, and the quality of hypertension care is considered less than optimal both in terms of blood pressure control and guideline-concordant prescribing.^{8,9} While hypertension ought to be

From the Department of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care, Boston, MA;¹ the Division of General Internal Medicine, Department of Medicine, University of Alberta, Edmonton, Alberta, Canada;² Harvard Vanguard Medical Associates, Medford, MA;³ and HealthCare Quality Initiatives, Newton, MA⁴

Address for correspondence:
Steven R. Simon, MD, MPH, Department of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care, 133 Brookline Avenue, Sixth Floor, Boston, MA 02215
E-mail: steven_simon@hms.harvard.edu
Manuscript received July 25, 2006;
accepted August 28, 2006



www.lejacq.com

ID: 5684

an ideal clinical situation to attempt educational outreach interventions, there have been surprisingly few studies of academic detailing to improve the prescribing of antihypertensive agents.¹⁰⁻¹⁴ Hypertension represents one of the few clinical conditions where better adherence to evidence-based prescribing guidelines, which suggest that low-dose thiazide diuretics should be initial agents for all patients without absolute contraindications, has the potential to improve quality of care and reduce costs.^{15,16}

We conducted a cluster randomized controlled trial of individual academic detailing vs group academic detailing vs usual care in 9 practice sites of a large mixed-model health maintenance organization (HMO). The study demonstrated measurable increases in the use of diuretics or β -blockers in both group detailing practices (13.2% absolute increase) and individual detailing practices (12.5%), compared with usual care practices (6.2%).¹⁴ These effects were limited to changes in prescribing for patients in whom hypertension was newly diagnosed and being treated; we observed no effect of switching patients on established antihypertensive therapy to preferred agents. Relatively few studies on academic detailing (or for that matter, any other practice change interventions) have assessed the costs and potential cost savings associated with individual or group detailing¹⁷ and, to our knowledge, no studies have directly compared these modalities. Our objective was to compare the costs and potential cost savings of individual academic detailing and group academic detailing interventions to increase the use of diuretics or β -blockers in the treatment of hypertension, compared with mailed information.

METHODS

Study Design

The study was a retrospective cost analysis of a cluster randomized controlled trial to improve antihypertensive medications in primary care, the methods of which have been described in detail elsewhere.¹⁴ The study was conducted at Harvard Community Health Plan, which, at the time of the study, was a mixed-model HMO that served approximately 650,000 individuals in 57 medical practices in New England. The study intervention occurred in 1995 from July to September. We randomly allocated 9 practices to 1 of 3 experimental arms. While physicians in 6 of the practices (ie, in 2 of the 3 administrative divisions of the HMO) were fully salaried and not subject to productivity incentives, physicians in 3 of the practices (ie, in the

third division of the HMO) had a portion of their salaries subject to productivity incentives; these 3 practices were randomly allocated to the 3 experimental arms of the study. The institutional review boards of Harvard Medical School and Harvard Pilgrim Health Care approved the study protocol.

Study Patients

All patients with incident hypertension receiving primary care at 1 of the 9 study sites were eligible for analysis. At baseline, there were 1066 patients with incident hypertension in the individual detailing sites, 1007 in the group detailing sites, and 1619 in the mail intervention sites.

Interventions

The interventions have been described in detail elsewhere.¹⁴ The goal of the interventions was to increase the use of diuretics and β -blockers in the pharmacologic treatment of hypertension, consistent with the prevailing fifth report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNC V) guidelines.¹⁸ All clinicians who provided primary care for adults (including internists, family physicians, nurse practitioners, and physician assistants) at the 9 study sites were included.

Usual Care. In April 1995, clinicians at all 9 practice sites received a mailing that contained printed material describing the current guidelines for prescribing antihypertensive medications and a laminated wallet card that summarized the guidelines. The 3 sites that received neither form of academic detailing were thus considered the usual care sites, which included 133 clinicians (99 physicians). Although we have termed this arm *usual care*, it does reflect enhanced dissemination activities compared with the release of most clinical practice guidelines within the organization.

Individual Academic Detailing. From July to September 1995, we conducted one-on-one educational outreach meetings among primary care physicians at each of the 3 practices randomized to this condition. The individual academic detailing intervention consisted of a single clinician visit from the trained detailer (a physician), incorporating the most important principles of academic detailing.¹ At these sites there were 114 clinicians (of whom approximately 75 were physicians). More than 80% of the full-time primary care physicians received the intervention to which they were allocated.¹⁴

Group Academic Detailing. During the same intervention period, each of the 3 detailers delivered 45-minute small-group (7 or 8 clinicians in attendance) academic detailing sessions at sites assigned to this condition. There were 120 clinicians (87 physicians) at the group detailing sites. Attendance records indicate that approximately 55% of the clinicians attended these sessions.

Calculation of Intervention Costs

We used process data (intervention notes and records) to derive costs associated with the interventions. These costs included measurements of material costs, training expenses, time spent by academic detailers visiting target physicians, time spent by participating physicians being detailed, rates of participation in the group and academic detailing interventions, and administrative time required. Costs for personnel were based on 1995 salaries of program staff and physician participants.

For individual detailing, detailer time (including time spent waiting for the target physician) ranged from 10 to 90 minutes per session, and target physician time (ie, time spent receiving the detailing) ranged from 5 to 30 minutes per session. For each group detailing session, we accounted for 1 hour for each participating physician and 1 hour for each detailer.

Calculation of Medication Costs

Costs of antihypertensive medications for patients with incident hypertension were assigned to each prescription unit (pills or capsules) using the 1995 Harvard Community Health Plan (HCHP)-negotiated formulary price of each chemically equivalent entity. For dispensings with National Drug Codes (NDCs) not matched in the formulary price database (20.7% of all dispensings), we assigned the average cost of all chemically equivalent entities of the same strength and formulation. For example, there were 19 different NDCs for hydrochlorothiazide 25-mg tablets, of which 8 had actual costs assigned. For the remaining 11 NDCs, we assigned the average of the 8 actual costs. In another example, for nifedipine 20-mg capsules, we identified 3 different NDCs in our database of dispensed medications and found actual formulary costs for 2 of these 3 NDCs; for the remaining NDC, we assigned the average of the 2 known NDCs. We excluded NDCs for which we had no such price data (0.12% of all dispensings).

For each dispensed medication, we determined the daily medication dose using the quantity and days supplied fields. When the days supplied

number was missing (7.8% of all dispensings), we used the usual daily dose, based on clinical judgment, for these agents. We then calculated the cost of antihypertensive medications to each day for which medications were supplied for each patient with incident hypertension.

Statistical Analyses

All analyses used intention-to-treat principles, so that clinicians practicing at a particular site were analyzed as if they had been exposed to the intervention assigned to that site, regardless of whether they attended an educational session or accessed the mailed guidelines. Similarly, drug costs for all patients were analyzed within the intervention arm to which their predominant prescriber of antihypertensive medications was assigned. This analysis took the perspective of the payer. All costs are reported in 1995 dollars.

The main analysis used linear regression to assess the intervention effects on average daily hypertension drug costs, controlling for baseline differences in costs. Additional analyses used generalized estimating equations to account for the effect of clustering at the level of the physician (ie, that the costs of antihypertensive medications of individual patients receiving care from the same prescriber are not statistically independent) and available patient-level covariates (age, sex, number of chronic diseases, presence or absence of diabetes, type of health insurance, number of months receiving antihypertensive agents during the subject's period of analysis, and HMO division). All analyses were conducted using SAS version 8.2 (SAS Institute, Inc, Cary, NC).

We estimated the medication cost savings to the level of the health plan by multiplying the annual per person cost savings by the number of newly diagnosed and treated patients with hypertension in a typical year within the health plan.

RESULTS

Intervention Costs

Based on administrative records, we estimate that the total costs of the mailed practice guideline, group detailing, and individual detailing interventions were approximately \$1000, \$5500, and \$7200, respectively. Provider and detailer time accounted for the bulk of the costs for each of the academic detailing interventions; the difference between the individual detailing intervention costs and the group detailing intervention costs were attributable to differences in these time costs (Figure). The typical length of an individual

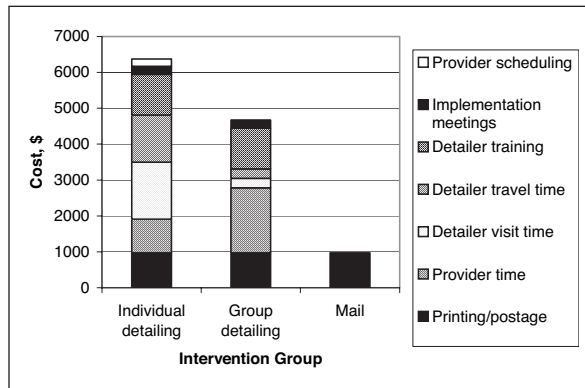


Figure. Intervention costs according to provider and detailer time.

detailing session was 30 minutes (range, 10–90 minutes), which included time the detailers spent traveling to the clinician's office and time spent waiting for the clinician to become available, and 60 minutes for the group sessions. The program cost estimates may range from \$5100 to \$5900 for the group detailing intervention and \$6300 to \$7900 for the individual detailing intervention, depending on the amount of time we assumed for meetings for which physician and detailer time was not recorded.

The cost of the individual detailing intervention was approximately \$96 per physician (range, \$84–\$105), given that there were 75 physicians in this arm. For HCHP, a health plan with 400 physicians, the estimated total cost of plan-wide individual academic detailing would have been approximately \$38,400 (range, \$33,600–\$42,100). There were 87 physicians in the group detailing arm, resulting in a per physician cost of \$63 (range, \$59–\$68) for the group detailing intervention. A plan-wide group detailing intervention program would cost approximately \$25,200 (range, \$23,600–\$27,200).

Medication Costs

Controlling for baseline costs in the first year following the intervention, the individual detailing intervention resulted in an estimated net decrease in average daily drug cost of \$0.0558 (95% confidence interval [CI], \$0.1336 savings to \$0.0250 cost increase) per person beyond the reductions in the mail (usual care) group (Table), although this finding did not reach statistical significance. This estimated net reduction corresponded to a savings of \$20.37 (95% CI, \$49.84 savings to \$9.11 cost increase) per person in the first year following the intervention. The group detailing intervention resulted in no change in the average daily cost of antihypertensive agents (estimated savings, \$0.0001; 95% CI, \$0.0803 savings to \$0.0801

cost increase). Controlling for clustering at the prescriber level and for all available covariates, estimates of cost savings were similar to the unadjusted analysis and, as in the unadjusted analysis, did not reach statistical significance.

In the second year following the intervention, cost savings relative to the usual care group were similar in both academic detailing interventions, although neither reached statistical significance (Table). Individual detailing resulted in a decrease in the average per person daily cost of antihypertensive medications of \$0.0486 (95% CI, \$0.1235 savings to \$0.0263 cost increase). The estimated per person daily cost savings in the second year following the group detailing intervention was \$0.0597 (95% CI, \$0.1372 savings to \$0.0177 cost increase).

Estimated annual cost savings for the 3 centers randomized to individual detailing (n=1066) would be \$21,711 (95% CI, \$53,131 savings to \$9709 cost increase). With 75 physicians in this arm, the estimated annual cost savings per physician were approximately \$289 (95% CI, \$708 savings to \$129 cost increase). At the time of the study, HCHP had approximately 7600 newly diagnosed and treated hypertensive patients in a typical year. Extrapolating to the plan level would thus result in an estimated \$155,000 savings with respect to antihypertensive medications (95% CI, \$379,000 savings to \$69,000 cost increase) with universal adoption of the individual detailing intervention.

DISCUSSION

In our previously reported randomized controlled trial, both individual and group academic detailing were associated with improved prescribing of desired antihypertensive agents.¹⁴ This result was more robust for individual detailing, the effect of which persisted through the second year of follow-up. In the present analysis of intervention program costs and cost savings, the individual academic detailing intervention resulted in estimated antihypertensive drug cost savings relative to the mailed intervention (usual care) in the first year following the intervention, although this finding did not reach statistical significance. We observed no cost savings attributable to the group detailing intervention in the first year after the intervention. Both interventions were estimated to result in cost savings in the second year following the intervention; however, neither of these results reached statistical significance.

The cost of the individual academic detailing program was estimated at \$96 per physician, with cost estimates ranging from \$84–\$105 per

INTERVENTION (YEAR)	CHANGE IN DAILY ANTIHYPERTENSIVE MEDICATION COSTS (95% CI), \$	P
Individual detailing (1)	-0.0558 (-0.1365 to 0.0250)	.176
Individual detailing (2)	-0.0486 (-0.1235 to 0.0263)	.203
Group detailing (1)	-0.0001 (-0.0803 to 0.0801)	.998
Group detailing (2)	-0.0597 (-0.1372 to 0.0177)	.131

*Average daily costs of antihypertensive medications in the baseline year were \$0.603 in usual care, \$0.559 in individual detailing, and \$0.584 in group detailing. Year indicates first (1) or second (2) year following the intervention; CI, confidence interval.

physician. In comparison, the individual detailing intervention resulted in estimated antihypertensive drug cost savings in the first year following intervention of \$289 (95% CI, \$708 savings to \$129 cost increase) per year for the average physician with approximately 10 patients in whom hypertension was newly diagnosed and treated annually. In 2006 dollars, the best estimate of the cost of the individual detailing program would be \$115 per physician and of the drug cost savings would be \$346.

Although not directly measured or considered in this study, our interventions may have also yielded some additional cost savings attributable to improved outcomes associated with the use of the first-line, guideline-recommended agents. In long-term randomized controlled trials, diuretics and β -blockers have resulted in reduced morbidity and mortality.¹⁹ These improved outcomes would likely result in cost savings resulting from decreased utilization of health services.

Although both individual and group academic detailing interventions seemed to be effective in increasing the use of diuretics and β -blockers for the treatment of hypertension, there was no suggestion of cost savings attributable to the group detailing arm. It is interesting to speculate whether the group detailing intervention would have had greater effectiveness and cost-effectiveness had more than the observed 55% of eligible physicians participated in the educational sessions.

Prior studies have shown the potential for substantial cost savings associated with increasing the use of guideline-recommended agents—diuretics and β -blockers—for the treatment of uncomplicated hypertension.^{16,20} These studies modeled cost savings based on shifting medication use in large populations of current users of antihypertensive medications. Estimates of cost savings from these studies are likely overly optimistic. In the real-world effectiveness trial we conducted, our interventions had no impact on switching antihypertensive agents for patients with prevalent hypertension.¹⁴ The bulk of the hypothesized savings in the analysis by Fischer and Avorn,¹⁶ for example, accrued

from switching agents. The present study shows potential cost savings (and costs) associated with shifting medication use among patients with newly diagnosed and treated hypertension in actual clinical settings, across multiple practices in a diverse HMO. Interventions to date have not demonstrated effectiveness in switching patients from existing therapies to alternate medication regimens.

This study has several important limitations. First, we examined only prescription drug costs, not costs related to disease-specific utilization or overall utilization, such as costs related to office visits or laboratory monitoring. In the report of the effects of the intervention on prescribing,¹⁴ we reported that hospitalizations occurred at a similarly low rate in each of the experimental arms. This study was not powered to detect differences in hospitalization costs attributable to the intervention and we did not measure total cost savings at the health plan level.

Second, in assigning costs to each dispensed medication, we did not have actual formulary price information for 20.7% of the dispensings. As such, we assigned the average cost of chemically equivalent entities to these dispensings. In cases where both generic and branded preparations were available for a given chemical entity, our methodology may have led us to undervalue the cost of branded agents and, in so doing, may have resulted in an underestimate of cost savings attributable to the intervention, since nonguideline drugs were more likely to be branded than guideline drugs. Finally, intervention costs were estimated from detailed notes taken by intervention participants but cost data were not directly collected during the trial; thus, some relevant costs may not have been ascertained.

Identifying cost-effective strategies to improve practice in primary care is critically important for quality of care and patient safety. Both individual and group academic detailing had modest intervention program costs, and both interventions resulted in improvements in the use of antihypertensive medications. Neither intervention resulted in increased medication costs, and

there was a nonsignificant trend toward cost-savings associated with individual detailing. These interventions represent effective and potentially cost-saving strategies for improving the use of medications for chronic disease in a managed care setting. Information on costs of academic detailing provided in this study could assist health plans in decision making regarding further expansion of academic detailing interventions to improve medication use in chronic medical conditions. Further studies should examine these interventions in other managed care settings and for other chronic conditions, with careful measurement of the costs and potential cost savings.

Acknowledgments and disclosures: We thank Eric Diddlemeyer for assistance with manuscript preparation and Fang Zhang for assistance with statistical analysis. This work was supported by a cooperative agreement (U18 HS 12019) from the Agency for Healthcare Research and Quality awarded to Dr Soumerai. Drs Simon and Soumerai are investigators in the HMO Research Network Center for Education and Research in Therapeutics funded by the Agency for Healthcare Research and Quality (U18 HS 010391). Dr Majumdar is a Population Health Investigator of the Alberta Heritage Foundation for Medical Research and a New Investigator of the Canadian Institutes of Health Research. The funders of this investigation had no role in the design of the study, analysis of the data, interpretation of the results, or the decision to publish.

REFERENCES

- Soumerai SB, Avorn J. Principles of educational outreach ('academic detailing') to improve clinical decision making. *JAMA*. 1990;263:549-556.
- Thomson O'Brien MA, Oxman AD, Davis DA, et al. Educational outreach visits: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*. 2000;CD000409.
- Santoso B, Suryawati S, Prawaitasari JE. Small group intervention vs. formal seminar for improving appropriate drug use. *Soc Sci Med*. 1996;42:1163-1168.
- Lundborg CS, Wahlstrom R, Oke T, et al. Influencing prescribing for urinary tract infection and asthma in primary care in Sweden: a randomized controlled trial of an interactive educational intervention. *J Clin Epidemiol*. 1999;52:801-812.
- Finkelstein JA, Davis RL, Dowell SF, et al. Reducing antibiotic use in children: a randomized trial in 12 practices. *Pediatrics*. 2001;108:1-7.
- Figueiras A, Sastre I, Tato F, et al. One-to-one versus group sessions to improve prescription in primary care: a pragmatic randomized controlled trial. *Med Care*. 2001;39:158-167.
- Diwan VK, Wahlstrom R, Tomson G, et al. Effects of group detailing on the prescribing of lipid-lowering drugs: a randomized controlled trial in Swedish primary care. *J Clin Epidemiol*. 1995;48:705-711.
- McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Engl J Med*. 2003;348:2635-2645.
- Majumdar SR, McAlister FA, Furberg CD. From knowledge to practice in chronic cardiovascular disease: a long and winding road. *J Am Coll Cardiol*. 2004;43:1738-1742.
- Inui TS, Yourtee EL, Williamson JW. Improved outcomes in hypertension after physician tutorials. A controlled trial. *Ann Intern Med*. 1976;84:646-651.
- Aucott JN, Pelecanos E, Dombrowski R, et al. Implementation of local guidelines for cost-effective management of hypertension. A trial of the firm system. *J Gen Intern Med*. 1996;11:139-146.
- Siegel D, Lopez J, Meier J, et al. Academic detailing to improve antihypertensive prescribing patterns. *Am J Hypertens*. 2003;16:508-511.
- Majumdar SR, Guirguis LM, Toth EL, et al. Controlled trial of a multifaceted intervention for improving quality of care for rural patients with type 2 diabetes. *Diabetes Care*. 2003;26:3061-3066.
- Simon SR, Majumdar SR, Prosser LA, et al. Group versus individual academic detailing to improve the use of antihypertensive medications in primary care: a cluster-randomized controlled trial. *Am J Med*. 2005;118:521-528.
- The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA*. 2003;289:2560-2572.
- Fischer MA, Avorn J. Economic implications of evidence-based prescribing for hypertension: can better care cost less? *JAMA*. 2004;291:1850-1856.
- Soumerai SB, Avorn J. Economic and policy analysis of university-based drug "detailing." *Med Care*. 1986;24:313-331.
- The fifth report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNC V). *Arch Intern Med*. 1993;153:154-183.
- The ALLHAT Officers and Coordinators for the ALLHAT Collaborative Research Group. Major outcomes in high-risk hypertensive patients randomized to angiotensin-converting enzyme inhibitor or calcium channel blocker vs diuretic: The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). *JAMA*. 2002;288:2981-2997.
- Xu KT, Moloney M, Phillips S. Economics of suboptimal drug use: cost-savings of using JNC-recommended medications for management of uncomplicated essential hypertension. *Am J Manag Care*. 2003;9:529-536.