

Principal Investigator: Soumerai, Stephen B.

AHRQ GRANT FINAL PROGRESS REPORT

RCT TO REDUCE PRESCRIBING ERRORS IN HYPERTENSION

Principal Investigator: Stephen B. Soumerai, ScD

Team Members:

Ken Kleinman, ScD

Sumit R. Majumdar, MD, MPH

Irina Miroshnik, MS

Lisa Prosser, PhD

Hector P. Rodriguez, MPH

Susanne Salem-Schatz, ScD

Steven R. Simon, MD, MPH

Philip C. Skelding, MPH

Cheryl Warner, MD

Organization: Harvard Pilgrim Health Care

Inclusive Dates of Project: 9/30/2001 - 3/31/2005

Federal Project Officer: Brenda Harding

Funded by the U.S. Agency for Healthcare Research and Quality (AHRQ), Grant Award Number 5U18HS012019-03

STRUCTURED ABSTRACT

Purpose: To compare two educational interventions, group versus individual academic detailing, to reduce prescribing errors in hypertension.

Scope: Suboptimal prescribing of antihypertensive medications is one type of medication error that contributes to adverse outcomes.

Methods: Cluster-randomized controlled trial in a large health maintenance organization. Subjects (N=9,820) were patients with newly treated hypertension in the year preceding the intervention (N=3,692), the 9 months following the intervention (N=3,556), and the second year following intervention (N=2,572). We randomly allocated three practice sites to group detailing (N=227 prescribers), three to individual detailing (N=235 prescribers), and three to usual care (N=319 prescribers). Individual detailing entailed a physician-educator meeting individually with clinicians to address barriers to prescribing guideline-recommended medications. The group detailing intervention incorporated the same social marketing principles in small groups of clinicians.

Results: In the first year following the intervention, the rates of diuretic or β -blocker use increased by 13.2% in the group detailing practices, 12.5% in the individual detailing practices, and 6.2% in the usual care practices. Compared with usual care practices, diuretic or β -blocker use was more likely in both group detailing practices (adjusted OR, 1.40; 95% CI, 1.11 – 1.76) and individual detailing practices (adjusted OR, 1.30; 95% CI, 0.95 – 1.79). Neither intervention affected blood pressure control. Two years following this single-visit intervention, there was still a trend suggesting a persistent effect of individual (OR, 1.22; 95% CI, 0.92 – 1.62), but not group (OR, 1.06; 95% CI, 0.80 – 1.39), detailing compared with usual care.

Key Words: Hypertension, medication errors, patient safety

PURPOSE

The main objective of the study was to compare group versus individual academic detailing to increase diuretic or β -blocker use in hypertension. In addition, the study aimed to compare the costs and cost savings of these interventions to improve the use of antihypertensive medications in ambulatory care.

SCOPE

Despite the wide dissemination of evidence-based practice guidelines,¹⁻⁶ the pharmacologic treatment of hypertension is suboptimal.⁷ Many patients with uncomplicated hypertension do not receive a diuretic or β -blocker, the guideline-recommended first-line medications that are relatively inexpensive and have proven superiority in preventing morbidity and mortality compared with newer classes of medication, with similar side effect profiles.⁸⁻¹¹ In 1996, no more than 41% of patients with hypertension were taking a diuretic, β -blocker, or both drugs.¹² Despite the morbidity and costs associated with hypertension and its complications,^{13,14} there have been few controlled studies of interventions to improve physicians' prescribing behavior in hypertension.¹⁵⁻¹⁸

Educational outreach, also called "academic detailing,"¹⁹ has been consistently demonstrated to be effective at improving physicians' prescribing behaviors.^{20,21} 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. Academic detailing has rarely been studied in the setting of improving the treatment of hypertension.¹⁸ Although academic detailing was originally conceived and proven effective as a one-on-one educational intervention, several studies have incorporated academic detailing principles in small-group sessions.²²⁻²⁷

In 1995, we conducted a quality improvement project using the principles of academic detailing to increase the use of diuretics and β -blockers among patients with hypertension. In this project, we analyzed the effects of this intervention, designed and carried out as a randomized controlled trial of group versus individual academic detailing, because the pharmacologic treatment of hypertension continues to be an area in need of improvement and because the core recommendations of the intervention – increasing the use of diuretics and β -blockers in uncomplicated hypertension – remain relevant today.

METHODS

Setting and Study Period

At the time of the study, Harvard Community Health Plan (HCHP) was a mixed-model HMO serving approximately 650,000 individuals in 57 medical practices in New England. HCHP comprised three separate administrative divisions, two of which were staff-model HMOs; one was a group-model (also known as an independent-practice association, or IPA-model) HMO. We recruited three geographically separated practices of similar size and demographic composition from each division.

The study intervention occurred from July to September 1995. Before undertaking analyses, we classified the 12 months preceding the intervention (July 1994 – June 1995) as the baseline period and October 1995 – June 1996 as the initial post-intervention follow-up period for the primary analysis. We also defined a long-term time period, July 1996 – June 1997, to assess the persistence of effect.

Overall Design

We conducted a cluster-randomized controlled trial²⁸ of three educational strategies to improve prescribing in hypertension: individual academic detailing, group academic detailing, and mailed educational materials (“usual care”). Each experimental arm consisted of three practice groups (one from each administrative division of the HMO). Practice administrators, clinicians, and patients were blinded with respect to study hypotheses. Blinding with respect to the experimental condition was not feasible. The institutional review boards of Harvard Medical School and of Harvard Pilgrim Health Care approved the study protocol.

Study Patients

All patients with hypertension (either incident or prevalent) receiving primary care at one of the nine study sites were eligible for analysis. We defined “incident” patients as those with newly diagnosed and treated hypertension within each time frame (baseline, initial follow up, long-term follow up). These patients were determined to have hypertension on the basis of having at least two outpatient encounters or one inpatient encounter with a hypertension diagnosis and evidence of a dispensed antihypertensive medication during the observation period. Thus, each analytic time period had a different cohort of incident patients. We associated a clinician with each patient by identifying the predominant prescriber of antihypertensive medications for that patient during the analytic time period of the patient’s incident hypertension.

In each time frame, we also identified patients with prevalent treated hypertension, defined as having at least two outpatient encounters or one inpatient encounter with a hypertension diagnosis and evidence of a dispensed antihypertensive medication during the 12-month period preceding the time frame of interest. A subset of prevalent patients in each time frame included patients who were considered to have incident treated hypertension in a preceding time frame.

Interventions

All clinicians providing primary care for adults at the nine study sites were included. Before developing the academic detailing interventions, we carried out a focus group among eight practicing physicians from the three HCHP administrative divisions. This 90-minute focus group consisted of open-ended discussions to identify potential barriers practicing physicians perceived when treating hypertension in general and the advantages and disadvantages of first-line agents versus non-preferred agents. Three physician perceptions emerged as the core barriers to using diuretics or β -blockers:

1. “Large doses of old drugs, such as β -blockers and diuretics, fail to control blood pressure, while smaller doses of new drugs do.”
2. “Older drugs cause more side effects, like impotence, lethargy, and depression.”
3. “New drugs do lower blood pressure; therefore, long-term outcomes will be same as older drugs.”

Physicians in the focus group session also expressed concern that patients would not understand a recommendation to return to older drugs when the physicians themselves may have previously discontinued the older drugs in favor of newer agents, such as ACE inhibitors or calcium channel blockers. We developed counterarguments in response to each of these perceptions and concerns.

We selected one respected physician idea champion, or "peer leader,"²⁹ from each HCHP administrative division to deliver the group and individual academic detailing sessions within that division. We conducted a full-day session to train the detailers, covering the principles of academic detailing, the clinical evidence and guidelines underlying the recommended prescribing practices, and role playing. This session emphasized training the detailers to teach physicians strategies for talking with patients about starting or switching to the guideline-recommended agents.

Usual Care. In April 1995, clinicians at all nine 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.

Individual Academic Detailing. From July – September 1995, we conducted one-on-one educational outreach meetings among primary care physicians at each of the three practices randomized to this condition. The intervention consisted of a single visit (15-30 minutes) from the trained detailer, incorporating the core principles and methods of academic detailing, described in detail elsewhere.¹⁹ These principles included 1) conducting surveys, interviews, or focus group sessions to investigate baseline knowledge and motivation for current and proposed prescribing patterns; 2) establishing credibility through a respected organizational sponsor, referencing authoritative and unbiased information sources, and presenting both sides of controversial issues; 3) stimulating physician participation in two-way interaction; 4) using concise and visually appealing graphical educational materials, specifically addressing real and perceived barriers to change; and 5) repeating and positively reinforcing a small number of desired behaviors within each detailing encounter. More than 80% of the full-time primary care physicians at the individual detailing sites received the intervention.

Group Academic Detailing. During the intervention period, each of the three trained detailers delivered 45-minute small-group (N=7-8 clinicians in attendance) academic detailing sessions at sites randomized to this condition. Attendance records indicate that approximately 55% of the clinicians at the group detailing sites attended these group educational sessions, simply reflecting the fact that it was logistically more difficult to schedule group meetings rather than one-to-one visits. The sessions were designed using the principles of academic detailing described above.¹⁹ In addition, we employed supportive group processes, such as encouraging individual clinicians to share success stories in overcoming barriers to adhering to guideline recommendations and providing clinicians with an opportunity for mutual reinforcement of desired practice behaviors.

Outcome measures

We measured prescribing of antihypertensive medications using the pre-existing pharmacy dispensing (claims) databases of HCHP. The main outcome

measure was change in guideline adherence (i.e., the proportion of patients with incident hypertension receiving a diuretic or β -blocker). A patient was considered to have received a diuretic or β -blocker if he or she received at least one prescription for either drug during the specified time frame. As a secondary outcome measure, we determined whether each of the patients with prevalent hypertension previously treated with antihypertensive agents other than diuretics or β -blockers received one of the recommended agents in each time frame.

Blood pressure measurements were available for patients seen in the three practices within the one administrative division of the HMO that had an electronic medical record. Among patients with incident hypertension in these practices, we measured the last recorded blood pressure in the baseline year and in the initial post-intervention period.

We estimated the average per-person cost of antihypertensive medications for incident patients. We determined the number of patients in each experimental arm who received diuretics, β -blockers, calcium channel blockers, and/or ACE inhibitors in the baseline year and in the initial post-intervention period. We multiplied the number of patients receiving each drug class by the annual cost (to the health plan) of the most commonly received agent and dosing strength within each class (i.e., hydrochlorothiazide 25 mg for diuretics, atenolol 50 mg for β -blockers, nifedipine XL 60 mg for calcium channel blockers, and lisinopril 20 mg for ACE inhibitors), assuming once-daily dosing. We summed all drug costs in each arm in each year and divided by the number of people in each group to obtain the annual antihypertensive drug costs per person.

We determined the costs of the interventions from administrative records and divided these costs by the number of patients with incident hypertension in the baseline year to obtain a conservative estimate of intervention cost per patient.

Covariates

We used automated health plan data to ascertain the following patient variables: age, sex, insurance type (HMO, Medicare, Medicaid, Fee-for-Service), and continuous enrollment in the health plan. We determined presence or absence of diabetes, based on one or more dispensed diabetes medications or one inpatient or two outpatient visits with diabetes codes during each patient's first year of observation. We calculated a chronic disease score (CDS) for each patient based on utilization of drugs for chronic disease in the first year of the study.^{30,31} We determined the median education level and median income of the census tract of residence for each patient.

We ascertained prescriber variables (age, sex, years in practice, degree [medical doctor, physician assistant, or nurse practitioner]) by linking provider names from the health plan claims data with public databases.^{32,33}

Statistical Analysis

The unit of allocation and the unit of intervention were the practice. The unit of analysis was the patient. To assess baseline comparability, we compared intervention and usual care patients with incident treated hypertension during the pre-intervention period with regard to the use of antihypertensive medications and other demographic and clinical variables that may be associated with use of diuretics or β -blockers.

We used logistic regression with generalized estimating equations (GEE) to estimate the effect of the interventions on prescribing of first-line agents and to control simultaneously for clustering at the level of the physician and for differences among individual patients.²⁸ In initial models, we accounted only for clustering by physician. We also evaluated models that adjusted simultaneously for patient and prescriber characteristics. In these more detailed analyses, point estimates and confidence intervals did not materially change; therefore, we present only the cluster-adjusted estimates. Each model included all patients with incident treated hypertension in each study period. In addition, we used GEE to assess the effect of the interventions on blood pressure, modeling the dichotomized outcome (systolic blood pressure ≤ 140 mmHg versus > 140 mmHg).

All analyses used intention-to-treat principles, such that clinicians practicing at a site were considered to have been exposed to the intervention assigned to that site, regardless of attendance at educational sessions. Similarly, all patients were analyzed within the intervention arm to which their predominant prescriber of antihypertensive medications was assigned.

RESULTS

Principal Findings

This investigation was successfully completed. Table 1 shows the baseline demographic and clinical characteristics of patients with incident treated hypertension. The rates of use of diuretics or β -blockers across the three arms were almost identical, as were the age and sex distributions and average chronic disease scores. Table 2 describes the characteristics of the primary care clinicians within each experimental condition.

Intervention Outcomes: Incident Patients. In the first year following the intervention, rates of use of diuretics or β -blockers increased by 13.2% in the group academic detailing practices, 12.5% in the individual detailing practices, and 6.2% in the mailed practice guideline (usual care) practices. These absolute increases correspond to proportional increases of 22.3% (group detailing), 21.7% (individual detailing), and 10.8% (usual care) compared with the baseline rates.

Relative to usual care practices, diuretic or β -blocker use was more likely in group detailing practices (OR, 1.40; 95% CI, 1.11 – 1.76) and individual detailing practices (OR, 1.30; 95% CI, 0.95 – 1.79), after controlling for physician-level clustering. The effects of group and individual detailing were of similar magnitude (OR for group versus individual detailing, 1.10; 95% CI, 0.86 – 1.42).

In the second year following the intervention, the absolute increase in use of the guideline-recommended agents over baseline was greater in the individual detailing practices (14.7%) than in the group detailing practices (11.3%) or the usual care practices (10.1%). During the second year following the intervention, 72.3% of patients in the individual detailing practices received diuretics or β -blockers compared with 70.4% in the group detailing practices and 67.7% in the mailed guideline practices. Although not statistically significant, our data suggest that, 2 years after the interventions, there was a trend suggestive of a persistent effect of individual detailing (OR, 1.22; 95% CI, 0.92 – 1.62), but not group detailing (OR, 1.06; 95% CI, 0.80 – 1.39).

The intervention appeared to have no clinically meaningful effect on blood pressure control. Compared with the patients in the mailed guideline practice, patients in the individual detailing practice were slightly but not significantly less likely to have systolic blood pressure less than 140 mmHg in the first year following intervention (OR, 0.87; 95% CI, 0.55 – 1.39). Patients in the group detailing practice and those in the mailed guideline practice had similar probability of achieving this level of blood pressure control (OR, 0.98; 95% CI, 0.65 – 1.49).

Intervention Outcomes: Prevalent Patients

There was no effect of either detailing intervention on switching patients with prevalent and treated hypertension to either diuretics or β -blockers. Compared with

the mailed guideline practices, the odds ratio for switching to diuretics or β -blockers was 1.20 in the individual detailing practices (95% CI, 0.76 – 1.90) and 1.35 in the group detailing practices (95% CI, 0.89 – 2.06).

Considering incident patients who received a diuretic or β -blocker in the baseline year, 83% of patients in the individual detailing practices and 77% of patients in the group detailing practices remained on diuretics or β -blockers in the first year following the intervention, compared with 74% in the mailed guideline practices.

Costs of Antihypertensive Medications, Intervention Costs, and Utilization

The estimated average per-person costs of antihypertensive medications in the baseline year were \$288 in the mailed guideline practices, \$277 in the individual detailing practices, and \$269 in the group detailing practices. In the year following intervention, the per-person costs decreased to \$219 in the mailed guideline practices, \$198 in the individual detailing practices, and \$220 in the group detailing practices. The per-patient reductions in medication costs were therefore \$69 in the mailed guideline practices, \$79 in the individual detailing practices, and \$49 in the group detailing practices.

The overall intervention costs were \$1,000 for the mailed guideline intervention (approximately \$1 per patient), \$3,500 (\$3.50 per patient) for group detailing, and \$5,000 (\$5 per patient) for individual detailing.

Discussion

Few controlled studies have demonstrated improvements in the pharmacologic management of hypertension outside clinical trials.^{16,18} This study found that both individual and group academic detailing were effective in improving the initial pharmacologic treatment of hypertension. Both detailing interventions resulted in approximately 13% absolute increases (or 20% relative increases) in the use of guideline-recommended agents for patients with newly treated hypertension compared with usual care. Our data suggest that the increased use of guideline-adherent therapies did not affect blood pressure control.

By the second year following the single-visit interventions, the effects of both group detailing and individual detailing had decayed. There was a nonsignificant trend toward a persistent effect in the individual detailing arm but not in the group detailing arm. To date, few studies have demonstrated the persistence of the effect of academic detailing beyond the first 6-12 months following intervention.³⁴ It is likely that a reinforcement session of some type would be necessary to maintain changes in behavior and, possibly, to engage physicians not captured in the initial session.

Neither detailing intervention resulted in any effect on switching patients to diuretics or β -blockers. Engaging physicians to switch patients' therapies likely requires more intensive intervention strategies than a single educational outreach visit.

Both group and individual academic detailing have been shown in prior studies to produce, on average, 15-30% relative increases over baseline in the desired clinical behavior.^{21,23,27} We observed effects of similar magnitude in the present study.

Because diabetes may be treated with ACE inhibitors as the first-line agent, we controlled for this condition in the main analyses; thus, this is unlikely to confound our observed effects.

A full economic analysis of the costs and cost savings related to the academic detailing interventions is in progress. Nevertheless, our observations indicate that the group detailing intervention (\$3,500) cost less than the individual detailing intervention (\$5,000) and that medication cost savings more than offset these intervention costs.

This study has several limitations. First, it was conducted in a single managed care organization, which limits the generalizability of the findings. However, this setting was a mixed-model HMO, including both staff- and group-model divisions. Furthermore, the large majority of healthcare in the United States is delivered via managed care plans, the enrollment of which currently exceeds 200 million.³⁵

Second, baseline adherence rates (58-59%) were substantially higher than national figures from the same time period.¹² We did not target the intervention to clinicians whose prescribing patterns indicated greater potential for improvement, one of the original core principles of academic detailing.¹⁹ Such targeting would likely have increased the observed effects of the academic detailing interventions.

Finally, although some may consider the age of our data to be the most important limitation of this study, the core guideline recommendations for diuretics and β -blockers as first-line agents in hypertension have remained unchanged.

Conclusions, Significance, Implications

Despite more than 25 years of widely circulated guidelines for care of patients with high blood pressure,¹ evidence-based treatment of hypertension continues to elude a large segment of clinical practice in the United States. We found that both individual and group academic detailing can increase the use of guideline-based treatments in hypertension. Additional study is needed to understand the economic ramifications of expanding this kind of intervention to improve the care of hypertension and other chronic diseases.

LIST OF PUBLICATIONS AND PRODUCTS

Simon SR, Majumdar SR, Prosser LA, et al. Group versus individual academic detailing to improve the use of antihypertensive medications in primary care: a randomized controlled trial. *Am J Med* 2005. (In Press).

Simon SR, Rodriguez HP, Soumerai SB, et al. Economic Analysis of a Randomized Trial of Academic Detailing Interventions to Improve Use of Antihypertensive Medications. (In Preparation)

Skelding PC, Majumdar SR, Soumerai SB, et al. Correlates of Adherence to Prescribing Guidelines for Hypertension in a Large Managed Care Organization. (In Preparation)

Reference List

1. Joint National Committee on Prevention Detection Evaluation and treatment of high blood pressure. Report of the Joint National Committee on Detection Evaluation and Treatment of High Blood Pressure. A cooperative study (JNC I). JAMA 1977; 237:255-261.
2. The 1980 report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. Arch Intern Med 1980; 140:1280-1285.
3. Joint National Committee on Prevention Detection Evaluation and treatment of high blood pressure. The 1984 Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. Arch Intern Med 1984; 144:1045-1057.
4. Joint National Committee on Prevention Detection Evaluation and treatment of high blood pressure. 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.
5. Joint National Committee on Prevention Detection Evaluation and treatment of high blood pressure. The sixth report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. Arch Intern Med 1997; 157:2413-2446.
6. Chobanian AV, Bakris GL, Black HR, et al. 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.
7. 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.
8. Major cardiovascular events in hypertensive patients randomized to doxazosin vs chlorthalidone: the antihypertensive and lipid-lowering treatment to prevent heart attack trial (ALLHAT). ALLHAT Collaborative Research Group. JAMA 2000; 283:1967-1975.
9. 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.
10. Moser M. Why are physicians not prescribing diuretics more frequently in the management of hypertension? JAMA 1998; 279:1813-1816.
11. Fischer MA, Avorn J. Economic implications of evidence-based prescribing for hypertension: can better care cost less? JAMA 2004; 291:1850-1856.

12. Stafford RS, Furberg CD, Finkelstein SN, et al. Impact of clinical trial results on national trends in alpha-blocker prescribing, 1996-2002. *JAMA* 2004; 291:54-62.
13. Freid V, Prager k, Mackay A, Xia H. Chartbook on trends in the health of Americans. 2003, Hyattsville, Maryland.
14. American Heart Association. Heart Disease and Stroke Statistics - 2004 Updated. 2003. Dallas, Texas, American Heart Association.
15. Inui TS, Yourtee EL, Williamson JW. Improved outcomes in hypertension after physician tutorials. A controlled trial. *Ann Intern Med* 1976; 84:646-651.
16. 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.
17. Borenstein JE, Graber G, Saltiel E, et al. Physician-pharmacist comanagement of hypertension: a randomized, comparative trial. *Pharmacotherapy* 2003; 23:209-216.
18. Siegel D, Lopez J, Meier J, et al. Academic detailing to improve antihypertensive prescribing patterns. *Am J Hypertens* 2003; 16:508-511.
19. Soumerai SB, Avorn J. Principles of educational outreach ('academic detailing') to improve clinical decision making. *JAMA* 1990; 263:549-556.
20. Educational outreach visits: effects on professional practice and health outcomes (Cochrane review). Oxford: Update Software, 1999.
21. Soumerai SB, Lipton HL, Majumdar SR. Evaluating and improving drug prescribing. In: Strom B, editor. *Pharmacoepidemiology*. New York: John Wiley & Sons, 2000.
22. 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.
23. van Eijk ME, Avorn J, Porsius AJ, de Boer A. Reducing prescribing of highly anticholinergic antidepressants for elderly people: randomized trial of group versus individual academic detailing. *BMJ* 2001; 322:654-657.
24. 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.
25. 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.

26. Santoso B, Suryawati S, Prawaitasari JE. Small group intervention vs. formal seminar for improving appropriate drug use. *Soc Sci Med* 1996; 42:1163-1168.
27. 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.
28. Murray DM. Design and analysis of group-randomized trials. Oxford University Press, 1998.
29. Finkelstein JA, Davis RL, Dowell SF, et al. Reducing antibiotic use in children: a randomized trial in 12 practices. *Pediatrics* 2001; 108:1-7.
30. Clark DO, Von Korff M, Saunders K, et al. A chronic disease score with empirically derived weights. *Med Care* 1995; 33:783-795.
31. Putnam KG, Buist DS, Fishman P, et al. Chronic disease score as a predictor of hospitalization. *Epidemiology* 2002; 13:340-346.
32. <http://profiles.massmedboard.org/Profiles/MA-Physician-Profile-Find-Doctor.asp>. Accessed: August 1, 2004.
33. Rhode Island Board of Medical Licensure and Discipline: Doc-Finder. Available at: <http://www.docboard.org/ri/df/search.htm>. Accessed: August 1, 2004.
34. Ray WA, Schaffner W, Federspiel CF. Persistence of improvement in antibiotic prescribing in office practice. *JAMA* 1985; 253:1774-1776.
35. America's Health Insurance Plans. Available at: www.ahip.org. Accessed: August 1, 2004.

Table 1. Baseline demographic and clinical characteristics of patients with newly treated hypertension in the baseline year (N=3,692) within each study group

Characteristic	Individual AD (N=1,066)	Group AD (N=1,007)	Mailed Information (N=1,619)
Sex, %			
Male	51.4	52.6	50.2
Female	48.6	47.4	49.9
Age, %			
<45 years	18.8	20.3	24.4
45–54 years	29.3	27.6	30.3
55–64 years	25.5	26.5	22.1
65–74 years	18.2	16.7	15.7
≥75 years	8.3	8.9	7.5
High School Education, % *	98.2	99.4	94.5

Median Household Income

25 th percentile	\$40,057	\$33,734	\$30,122
Median	\$50,364	\$40,888	\$38,906
75 th percentile	\$65,674	\$52,579	\$47,552

Insurance Type

HMO	75.7	77.9	77.4
Medicare	20.0	18.2	17.4
Other [†]	4.3	4.0	5.2
Continuous health plan enrollment, %	76.5	78.2	73.3
Diabetes, %	9.4	10.7	12.7
Chronic Disease Score, [‡] mean (sd)	893.2 (611)	890.1 (575.1)	899.4 (652.7)
Rates of antihypertensive medication use [§]			
β-blockers, %	37.2	34.9	33.9
Diuretics, %	28.7	32.3	32.2
β-blockers or diuretics, %	57.6	59.1	57.6
ACE Inhibitors or ARB, %	46.8	42	46.2
Calcium-channel blockers, %	27.1	30.8	31.7
Other antihypertensive agents, %	6.4	6.6	6.1

*Education level was missing for 111 patients who were under age 25 years.

†Includes Medicaid and indemnity insurance plans.

‡See description in text.

§Overall rates of antihypertensive medication sum to greater than 100%, because some patients were taking multiple medications.

Abbreviations: AD=academic detailing; HMO=health maintenance organization;
ARB=angiotensin receptor blocker; sd=standard deviation.

Table 2. Baseline characteristics of prescribing clinicians (N=367) within each study group in the baseline period

Characteristic	Individual AD (N=114)	Group AD (N=120)	Mailed Info (N=133)
Sex,* %			
Male	57	70	62.5
Female	43	30	37.5
Years of Practice,*			
% <10	25.3	21.3	22.1
10-20	48.1	44.7	51.0
≥21	26.6	34.0	26.9
Degree,* % (n=276)			
MD	65.8	72.3	74.8
PA or NP	34.2	27.7	25.2

*Data on sex and years of practice were available for 277 of the 367 prescribers. The degree was known for 276 of the 367 prescribers.

Abbreviations: AD=academic detailing; PA=physician assistant; NP=nurse practitioner.