A Randomized Trial of Direct-to-Patient Communication to Enhance Adherence to β-Blocker Therapy Following Myocardial Infarction

The Harvard community has made this article openly available. Please share how this access benefits you. Your story matters

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Published Version</td>
<td>doi:10.1001/archinternmed.2007.132</td>
</tr>
<tr>
<td>Citable link</td>
<td><a href="http://nrs.harvard.edu/urn-3:HUL.InstRepos:32692593">http://nrs.harvard.edu/urn-3:HUL.InstRepos:32692593</a></td>
</tr>
<tr>
<td>Terms of Use</td>
<td>This article was downloaded from Harvard University’s DASH repository, and is made available under the terms and conditions applicable to Other Posted Material, as set forth at <a href="http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA">http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA</a></td>
</tr>
</tbody>
</table>

A Randomized Trial of Direct-to-Patient Communication to Enhance Adherence to β-Blocker Therapy Following Myocardial Infarction

David H. Smith, RPh, PhD; Judith M. Kramer, MD, MS; Nancy Perrin, PhD; Richard Platt, MD, MS; Douglas W. Roblin, PhD; Kimberly Lane, MPH; Michael Goodman, PhD; Winnie W. Nelson, PharmD, MS; Xiuhai Yang, MS; Stephen B. Soumerai, ScD

Background: Although β-blockers are routinely prescribed at hospital discharge after myocardial infarction (MI), patients’ adherence has been shown to decline substantially over time. We sought to test the hypothesis that a simple, direct-to-patient intervention can improve adherence to β-blocker therapy following MI.

Methods: We conducted a cluster randomized controlled trial in 4 geographically dispersed health maintenance organizations testing the hypothesis that a simple direct-to-patient intervention could improve adherence. The study was carried out from June 2004 to March 2005. The primary analyses were based on 836 post-MI patients who were dispensed a β-blocker prescription after discharge. The intervention consisted of 2 mailings 2 months apart describing the importance of β-blocker use. The main outcomes were proportion of days covered with β-blocker therapy and percentage of patients with at least 80% of days covered in the 9 months after the first mailing. Analyses were adjusted for age, sex, total medications dispensed, days between MI and intervention, and intervention site.

Results: Over the entire follow-up period, patients in the treatment arm had a mean absolute increase of 4.3% of days covered per month compared with patients in the control arm (a 5.7% relative change from baseline), representing 1.3 extra days (P = .04). Treatment patients were 17% more likely (relative risk, 1.17; 95% confidence interval, 1.02-1.29) to have 80% of days covered. For every 16 patients receiving the intervention, 1 additional patient would become adherent (80% or more days covered per month).

Conclusion: A low-cost, easily replicable effort to increase adherence can have a demonstrable impact on β-blocker adherence following MI.

Trial Registration: clinicaltrials.gov Identifier: NCT00211172

Arch Intern Med. 2008;168(5):477-483

MORE THAN 13 MILLION adult Americans have coronary heart disease (CHD); more than 7 million have had myocardial infarction (MI). The joint American Heart Association and American College of Cardiology guidelines address the treatment of patients with MI and recommend that post-MI patients receive antiplatelet and β-blocker therapy and that many patients should also receive lipid-lowering agents and angiotensin-converting enzyme inhibitors (ACEIs). Investigators estimate that if all MI survivors in 2000 in the United States persisted with β-blocker use for 20 years, 45,000 life-years would be gained and that MI patients discontinuing β-blocker use are almost twice as likely to die in the next year.

See Invited Commentary at end of article

Efforts to improve initiation of β-blocker prescribing following MI within hospital settings often target physicians, but patient-oriented strategies are likely needed to encourage prolonged use in the community. Maintaining adherence after MI requires that patients understand the therapeutic benefits, recognize the need for long-term use, and are motivated to adhere to the regimen despite inconvenience, cost, potentially conflicting messages from family or friends.
and potential adverse effects. Studies to enhance medication adherence have often been multimodal, making it impossible to disentangle the effects of a single intervention. The findings of previous studies in patients with MI and cardiac events suggest that mailed reminders may be able to increase medication refills and uptake, but the studies were not designed to detect moderate effects and have been criticized on other grounds.

We sought to improve on the existing literature by using a rigorous randomized control design powered to detect a 10% difference and by informing the intervention material content using qualitative methods. Unlike interventions providing general education, our intervention provided a specific message about long-term adherence to β-blocker therapy. We directed the intervention to patients with acute MI, with simultaneous reinforcement in communication with their physicians. We used an easily replicable, low-cost approach embracing physician behavior change principles of brevity, repetition, and reinforcement.

**METHODS**

We carried out a cluster randomized trial in 4 geographically diverse sites, including Boston, Massachusetts, Minneapolis, Minnesota, Atlanta, Georgia, and Portland, Oregon, testing the hypothesis that mailed communications to patients and primary care providers would be more effective than usual care at promoting adherence to β-blocker therapy following MI.

**INTERVENTION DESIGN**

Using accepted qualitative methods, we developed the format and content of materials with focus groups (including cognitive pretesting). Focus group participants were MI patients who had been dispensed a β-blocker prescription and whose MI had occurred in the 365 days prior to the focus group meeting. Participants revealed that major barriers to β-blocker adherence included concerns of adverse effects, forgetting to refill prescriptions, and interruptions in routine. Suggestions for informational content for the mailings included the following: (1) reasons the drugs are important in MI treatment, (2) risks of not taking them, and (3) information on adverse effects. Patients wanted the letters to be personalized and written in lay language. They also thought that they would be most likely to open and read a letter if it came from their clinician; resource constraints prohibited this goal, but the letter did come from a health plan physician/administrator.

The intervention consisted of 2 mailed communications. A personalized letter was mailed first, followed approximately 2 months later by a similar letter and an accompanying brochure. Both mailings also included a wallet card that suggested questions for the patient to ask their clinician, space to list their medications, and space to record additional queries. The communications contained nearly identical information, stressing the importance of lifetime use of β-blockers following MI and that adverse effects can be managed and the importance of remembering to refill their prescription. They also included a brief mention of other therapies (statins, ACEIs, and aspirin).

Primary care clinicians of patients randomized to the intervention arm received sample materials and a letter alerting them that their patients with MI would be receiving materials developed with input from patients and clinicians in primary care and cardiology. The letters asked the primary care clinicians to support the initiative and reminded them of guidelines on lifetime use of β-blockers following MI.

Because we wanted to study the intervention’s effects compared with usual care, neither patients nor clinicians randomized to the control group were contacted but were followed using the same data systems as the intervention group.

**ELIGIBILITY CRITERIA**

We included people with a discharge diagnosis of MI (International Classification of Diseases, Ninth Revision codes 410.xx) between December 1, 2003 (start of enrollment), and June 18, 2004 (end of enrollment), who were at least 18 years old and had a β-blocker prescription dispensed (first β-blocker prescription was the index) before June 18, 2004. The intervention mailing took place at the end of July 2004; thus, a patient may have had their MI from 1 to 7.5 months before to the date of the mailing. Between the date of the qualifying MI and the mailed intervention, patients were required to have health plan and prescription eligibility and to have survived. For efficiency and to replicate methods commonly used by health plans, we mailed materials to each site’s patients on the same calendar date.

**RANDOMIZATION, FOLLOW-UP, AND DATA SOURCES**

At 3 sites, physician practices were listed from highest to lowest according to the number of eligible patients and then randomly assigned by computer to intervention or usual care in sequential pairs (blocks of 2). This approach to randomization was undertaken to avoid contamination of the usual care group and to ensure that the 2 arms were of comparable sizes. One site (40% of the population) failed to randomize by practice and instead performed simple randomization by patient; this conservative error could only decrease the effect size of the intervention through increased contamination. Group assignment was concealed until allocation; outcome assessment was blinded, and randomization by protocol was done by analysts at each site. Patients were followed for 9 months after the date of the first intervention. The institutional review board at each participating site approved the study.

Electronically stored data at each site were used, including membership files, inpatient and ambulatory visits, and pharmacy data.

**OUTCOMES**

The primary outcome measure was β-blocker adherence (degree of prescription filling in an interval) derived from pharmacy prescription records by constructing a proportion-of-days-covered (PDC) per-month (defined as 30 days) measure, using the quantity dispensed and days supplied from each prescription. Previous analyses found good agreement between the recorded day’s supply and audit of directions for use. For consistency with other literature, we analyzed medication adherence as the effect size of the intervention through increased contamination. Group assignment was concealed until allocation; outcome assessment was blinded, and randomization by protocol was done by analysts at each site. Patients were followed for 9 months after the date of the first intervention. The institutional review board at each participating site approved the study.

Electronically stored data at each site were used, including membership files, inpatient and ambulatory visits, and pharmacy data.

All patients were part of the primary outcome measure. Since not all patients necessarily had a current prescription at the time of the intervention, we undertook 2 secondary analyses to assess whether the intervention was associated with changes in discontinuation of β-blocker therapy or time to restarting β-blocker therapy. Discontinuation was defined as a complete lack of prescription filling during a given interval. Because of uncertainty regarding the definition of β-blocker discontinuation, we examined gaps of at least 1, 2, 3, and 4 months. We also examined time to restarting β-blocker therapy for patients without a current prescription at the time of the intervention. Since the wallet card materials also advised the patient to discuss the use of statins and ACEIs with their physician, we examined changes
in use of these agents as secondary end points. Data on over-the-counter aspirin use were not available.

We estimated the replication cost of the intervention, including nonlabor costs of postage and printing, as well as labor costs of preparing the materials (eg, graphics and mailing) from prices paid and effort expended during the study.

SAMPLE SIZE

We aimed to enroll 1000 patients to achieve 80% power using a 5% significance level (after taking account of clustering) to detect a 10% difference in adherence. A total of 907 patients met inclusion criteria, and after excluding patients who died or lost health plan eligibility before the intervention and during the follow-up period, the study population comprised 836 patients (intervention arm, n = 426; and control arm, n = 410).

ANALYSIS

We examined the effectiveness of randomization by comparing demographic characteristics and preintervention PDC per month (ie, PDC from the date of the first β-blocker prescription following MI discharge until the intervention date) of intervention and control arm participants. All analyses controlled for patient age, sex, annualized number of medications in the year before the intervention date (as comorbidity adjustment), time between index β-blocker prescription and intervention date, and intervention site. Interactions between study arm and covariates were also investigated. We controlled for prior statin or ACEI and/or ARB use in secondary analyses on their postintervention use. Because the most common antiplatelet drug, aspirin, is over the counter, we were not able to control for prior antiplatelet drugs. All analyses were carried out using SAS version 8.2 (SAS Institute Inc, Cary, North Carolina) and HLM 6.0 (SSI, Lincolnwood, Illinois) statistical software.

Primary Analyses

Growth curve analysis (also called multilevel modeling), a technique to estimate change in a patient’s outcome over time, was used to evaluate the effect of the intervention on PDC. Time in months formed the first level of the model, with PDC as the dependent variable. For ease of interpretation, time was grand centered, setting the midpoint of the follow-up time to zero. In the second level, we modeled both the intercept and the time slope as a function of the covariates and study arm. Practice randomization performed. Growth curve analysis also was used to estimate the likelihood of patients having at least an 80% PDC during the postintervention period using logistic regression; we also calculated the number of patients needed to treat. Because a PDC of 80% occurred more than 10% of the time in our sample, we corrected the resulting odds ratio so it could be interpreted as a relative risk (RR).

Secondary Analyses

The secondary end points were (1) discontinuation of β-blocker therapy among patients with a current β-blocker prescription at the start of the intervention and (2) restarting β-blocker therapy among patients without a current β-blocker prescription at the start of the intervention. For these analyses we used Cox proportional hazards to model time to discontinuation and time to restart, accounting for clusters, with treatment assignment as the main effect and variables to control for differences in medication supply and time between end of the last preintervention β-blocker prescription and the date of the intervention. Finally, we examined differences in statin or ACEI and/or ARB use between intervention and control patients using negative binomial regression, with correction for overdispersion and clustering.

RESULTS

As Figure 1 shows, a total of 907 patients in 142 total practices (13, 15, 19, and 95, by site) met all inclusion criteria and were enrolled in the study; 458 patients were randomized to the intervention arm and 449 to the control arm. Before the intervention date, 19 patients died or lost health plan eligibility (intervention arm, n = 5; and control arm, n = 14), another 52 patients (6%) died during the 9-month follow-up period (intervention arm, n = 27; and control arm, n = 25). Therefore, the primary analyses were based on 836 patients (intervention arm, n = 426; and control arm, n = 410). At the time of the first mailing, patients in the intervention group were a mean 138 days after MI (range, 34-225 days), and those in the control group were 134 days after MI (range, 38-226 days). Patients in the intervention arm and those in the control arm were similar in terms of...
demographic and clinical characteristics (Table 1), and PDC per month in the 6-month period from MI discharge to the initial mailing was also similar between the 2 study arms (Table 2). In the intervention arm, PDC declined to 75% at the time of the initial direct-to-patient mailing, and PDC declined to 74% in the control arm. Baseline monthly PDC over time exhibited a similar pattern of drop-off for both groups, totaling about 13% per month in the first 2 months after the index β-blocker prescription, then slowing to less than 3%.

Our analysis showed that over the entire follow-up period, patients in the treatment arm had a mean absolute increase of 4.3% of days covered per month compared with patients in the control arm (a 5.7% relative change from baseline), representing approximately 1.3 extra days of β-blocker coverage per month (P = .04) (Figure 2). The intervention group experienced a smaller immediate drop in monthly PDC, and the subsequent rate of decline in PDC was not different between the 2 arms (P = .68), indicating that the effect was immediate and sustained over time. We did not find a site-by-arm interaction, indicating that the treatment effect was consistent across sites. The intraclass correlation for practice was 0.016. To avoid estimating PDC after death, only patients who did not die during follow-up were included in the analysis (n = 836). An analysis including all patients yielded nearly identical results. Proportion of days covered in the month before the intervention did not differ appreciably (control arm, 86%; and intervention arm, 87%). None of the interactions of arm with the covariates were significant.

Across all months of follow-up, a mean of 64.8% of intervention patients had a PDC of 80% or greater compared with 58.3% of control group patients, suggesting a number needed to treat of 16. Patients in the intervention arm were 17% more likely (RR, 1.17; 95% CI, 1.02-

### Table 1. Baseline Demographic Characteristics by Intervention and Control Arms

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male sex, %</td>
<td>68.7</td>
<td>66.0</td>
</tr>
<tr>
<td>Age, mean (SD), y</td>
<td>64.69 (14.19)</td>
<td>65.04 (13.38)</td>
</tr>
<tr>
<td>Medicare, %</td>
<td>46.4</td>
<td>47.1</td>
</tr>
<tr>
<td>Medicaid, %</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>First β-blocker after MI, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atenolol (n = 455)</td>
<td>51.0</td>
<td>51.5</td>
</tr>
<tr>
<td>Carvedilol (n = 44)</td>
<td>5.3</td>
<td>4.6</td>
</tr>
<tr>
<td>Metoprolol (n = 455)</td>
<td>51.0</td>
<td>51.5</td>
</tr>
<tr>
<td>No. of angiotensin-converting enzyme inhibitor prescriptions 1 year before to the intervention, mean (SD)</td>
<td>3.38 (3.16)</td>
<td>3.56 (3.40)</td>
</tr>
<tr>
<td>No. of angiotensin receptor blocker prescriptions 1 year before to the intervention, mean (SD)</td>
<td>0.64 (2.12)</td>
<td>0.63 (2.05)</td>
</tr>
<tr>
<td>No. of statin prescriptions 1 year before to the intervention, mean (SD)</td>
<td>4.35 (3.06)</td>
<td>4.35 (3.17)</td>
</tr>
<tr>
<td>Total No. of unique medications 1 year before to the intervention, mean (SD)</td>
<td>9.52 (7.74)</td>
<td>8.88 (7.48)</td>
</tr>
</tbody>
</table>

Table 2. Baseline Monthly Proportion of Days Covered (PDC) by Arm: Monthly β-Blocker PDC Following Myocardial Infarction (MI) but Before the Intervention by Study Arm for Patients With at Least 1 Month of Observationa

<table>
<thead>
<tr>
<th>Months After Index</th>
<th>β-Blocker Prescription</th>
<th>Mean PDC, %</th>
<th>% With PDC</th>
<th>Mean PDC, %</th>
<th>% With PDC</th>
<th>Mean PDC, %</th>
<th>% With PDC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 1-20 21-79 &gt;80</td>
<td></td>
<td></td>
<td>0 1-20 21-79 &gt;80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>453 99.1 0.2 0.9 98.9</td>
<td>435 98.6 0 0 2.8 97.2 888 98.9</td>
<td>0 0.1 1.8 98.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>377 85.6 8.0 1.3 9.8 80.9 368 84.4 9.5 2.5 6.5 81.5 745 85.0</td>
<td>8.7 1.9 8.2 81.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>304 82.5 10.2 1.3 11.8 76.6 301 81.4 11.3 2.7 8.3 77.7 605 81.9 10.7 2.0 10.1 77.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>227 79.6 12.8 4.0 7.1 76.2 222 77.7 12.6 3.6 12.2 71.6 449 78.7 12.7 3.8 9.6 73.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>139 76.5 15.1 2.9 10.1 71.9 156 75.5 16.0 1.9 12.8 69.2 295 76.0 15.6 2.4 11.5 70.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>73 74.9 16.4 5.5 45.5 72.6 82 73.8 19.5 1.2 11.0 68.3 155 74.3 18.1 3.2 8.4 70.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Not all patients had a full month of observation after their MI to calculate a meaningful monthly PDC. Because patients may have had their MI up to 7.5 months before the date of the intervention mailing, fewer patients were observed with each passing month. The index β-blocker prescription is the first β-blocker prescription between the date of MI and the intervention date.
**COMMENT**

Using a simple, low-cost, direct-to-patient mass mailing, we found that 17% more post-MI patients had a PDC of at least 80% (RR, 1.17; 95% CI, 1.02-1.29) with β-blocker therapy. The number of intervention packets mailed for 1 additional adherent patient was 16. Our findings are important because many health care providers, particularly integrated delivery systems, routinely use mass mailed interventions as a way to promote healthy behaviors. We studied the intervention’s effect in a real-world setting with very few inclusion requirements, maximizing the finding’s applicability. Perhaps most importantly, we assessed all eligible post-MI patients at the participating sites; limited participation was an important limitation to other adherence studies. Rarely are such interventions tested in a randomized fashion, as we did. Our findings are largely consistent with existing literature in other diseases showing modest, positive effects for mailed interventions (but often multimodal) on medication adherence.27

Studies of methods to improve the use of β-blockers following MI in the US health care system have focused mainly on providers.28,29 Mailed prompts to patients and providers have shown only marginal success in other health care settings; to our knowledge, our randomized trial is the first to assess the impact of a customized, direct-to-patient intervention designed to increase adherence to β-blocker therapy following MI in the US health care setting.

Our finding that 17% more patients are adherent is encouraging. Poor adherence has been linked to worsening outcomes, including death, in the context of post-MI use of β-blockers,30 so it seems likely that enhancing patient adherence to β-blocker therapy following MI leads to improved outcomes. For example, Choudhry and colleagues31 estimate that if only 2.5% more patients adhere to therapy, providing secondary MI prevention medications (including β-blockers) for free (much more expensive than our intervention) would be cost saving to a health plan through decreased cardiac events.

Similar to other studies,6 we found the drop-off in adherence to be most dramatic in the initial 2 months after the index β-blocker prescription (about 13%). This suggests that patients in the initial post-MI period deserve particular attention, but like previous studies, the decline in adherence we observed continues at a fairly steady rate (about 3% per month).

We studied the intervention’s effect in prepaid integrated care delivery, potentially limiting the generalizability to other insurance types. We did not find evidence of statistical interaction, but our study may have been underpowered to detect modest interactions. We used a proxy for adherence, namely prescriptions dispensed, that reflects the health care system’s capability to deliver medication to the patient; actual drug-taking behavior may differ. In addition, we have little empirical evidence to use for determining the minimal level of medication adherence necessary in the context of post-MI β-blocker use. We used a PDC of 80%, similar to other

### Table 3. Cox Regression of Discontinuation by Study Arm Among Those With Current Day’s Supply at Time of Intervention

<table>
<thead>
<tr>
<th>Discontinuation, Months of Gap in Filling Prescription</th>
<th>No. (%) With Gap</th>
<th>Crude Hazard Ratio* (95% Confidence Interval)</th>
<th>Adjusted Hazard Ratio* (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>104 (23)</td>
<td>110 (25)</td>
<td>0.85 (0.65-1.12)</td>
</tr>
<tr>
<td>2</td>
<td>63 (14)</td>
<td>67 (15)</td>
<td>0.86 (0.61-1.22)</td>
</tr>
<tr>
<td>3</td>
<td>43 (9)</td>
<td>51 (12)</td>
<td>0.77 (0.51-1.16)</td>
</tr>
<tr>
<td>4</td>
<td>30 (7)</td>
<td>37 (9)</td>
<td>0.74 (0.46-1.20)</td>
</tr>
</tbody>
</table>

*Because the crude hazard ratio comes from a Cox regression model (and thus accounts for time), the crude hazard ratio cannot be derived directly from the Table.

### Table 4. Per-Person Use of ACEIs, ARBs, and Statins Following the Intervention

<table>
<thead>
<tr>
<th>Mean No. of Prescriptions</th>
<th>Rate Ratio (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intervention (n = 453)</td>
</tr>
<tr>
<td>ACEIs and/or ARBs</td>
<td>4.27 3.72</td>
</tr>
<tr>
<td>Statins</td>
<td>4.85 4.68</td>
</tr>
</tbody>
</table>

Abbreviations: ACEIs, angiotensin-converting enzyme inhibitors; ARBs, angiotensin receptor blockers.
research in this clinical area,\textsuperscript{6,21} and also report the mean adherence level observed. Our estimates of adherence did not take account of the following 2 competing explanations for adherence: (1) changes to a patient's regimen after dispensing, making our estimates susceptible to both overestimation and underestimation of adherence, and (2) we did not correct for hospital stays, during which time a patient's outpatient medication supply would likely not be used. Because we were most interested in the comparative effect of the intervention, our randomized design minimizes both of these concerns. As others\textsuperscript{14} have noted, assessment of the impact on outcomes is missing in most adherence studies; our study is similarly limited. In addition, future work should consider both the potential cost-effectiveness of such an adherence intervention and the opportunity costs of focusing on 1 therapy (eg, diminishing adherence to other therapies).

Increasing adherence to evidence-based therapies for patients with MI is a priority for improving quality of care. We found that a low-cost, easily replicable intervention can have an impact on patient's adherence to \( \beta \)-blocker therapy following MI.

Accepted for Publication: September 27, 2007.

Author Affiliations: Center for Health Research, Kaiser Permanente Northwest, Portland, Oregon (Drs Smith, Perrin, and Goodman and Mr Yang); HMO Research Network's Center for Education and Research on Therapeutics (CERTs), Boston, Massachusetts (Drs Smith, Perrin, Platt, Roblin, Goodman, Nelson, and Soumerai, Ms Lane, and Mr Yang); Duke Center for Education and Research on Therapeutics, Durham, North Carolina (Dr Kramer); Department of Ambulatory Care and Prevention, School of Nursing, Oregon Health and Sciences University, Portland (Dr Perrin); Department of Ambulatory Care and Prevention, Harvard Medical School, and Harvard Pilgrim Health Care, Boston, Massachusetts (Drs Platt and Soumerai and Ms Lane); Health Partners Research Foundation, Minneapolis, Minnesota (Drs Goodman and Nelson); and Kaiser Permanente, Atlanta, Georgia (Dr Roblin).

Correspondence: David H. Smith, RPh, PhD, Center for Health Research, Kaiser Permanente Northwest, 3800 N Interstate Ave, Portland, OR 97227 (david.h.smith@kpchr.org).

Author Contributions: Dr Perrin had full access to the data in the study and takes responsibility for the integrity of the data. Study concept and design: Smith, Kramer, Perrin, Platt, Roblin, Goodman, Nelson, and Soumerai. Acquisition of data: Platt, Roblin, Lane, Goodman, Nelson, and Yang. Analysis and interpretation of data: Smith, Kramer, Perrin, Platt, Roblin, Lane, Goodman, Nelson, and Soumerai. Drafting of the manuscript: Smith and Perrin. Critical revision of the manuscript for important intellectual content: Smith, Kramer, Perrin, Platt, Roblin, Lane, Goodman, Nelson, and Soumerai. Statistical analysis: Perrin, Yang, and Soumerai. Obtained funding: Smith, Platt, Lane, and Soumerai. Administrative, technical, and material support: Lane and Nelson. Study supervision: Smith, Kramer, and Roblin.

Financial Disclosure: None reported.

Funding/Support: This work was supported by a cooperative agreement (2 U18 HS 010391-04) from the Agency for Healthcare Research and Quality.

Role of the Sponsor: The funders had no role in the design, analysis, and interpretation of the results or in the decision to publish.

Additional Contributions: Mara Kalter provided project management, and Jim Livingson provided programming assistance.


REFERENCES


The decline in mortality from cardiovascular disease in the United States over the past 30 years has been due in large part to the steady adoption of new preventive and therapeutic strategies. Over the past 10 to 15 years, there has been increasing recognition that broad adoption of established strategies may have value equivalent to that of the adoption of new strategies. As a result of this recognition, there have been large-scale efforts to improve rates of prescription of proven medications, and these efforts are achieving success. On the heels of this success, quality-of-care efforts are evolving further and are beginning to focus on ensuring that patients actually take these proven medications once they have been prescribed.

The study by Smith and colleagues of an intervention to improve β-blocker adherence in this issue of the Archives is thus a welcome addition to the literature. The authors sent information about β-blockers to patients who had had a myocardial infarction and assessed the effect of the mailing on subsequent adherence. Strengths of the study include the use of focus groups to tailor the content of the mailing, a sample size large enough to detect a small benefit, and reliance on a simple, easily reproduced intervention. The principal finding of the study was that the proportion of days covered, a standard measure of adherence based on pharmacy records, was modestly but significantly greater by approximately 5% in the intervention group. One concern with interventions targeted at a single medication is that they may improve performance related to that medication but lower performance related to other medications. In the study by Smith and colleagues, use of angiotensin-converting enzyme inhibitors and angiotensin receptor blockers improved and statin use remained stable, suggesting that the intervention was not a “zero sum game,” although it will be important in the future to assess for negative effects on adherence to medications for important comorbid conditions such as diabetes. The authors were also unable to assess aspirin use, but since aspirin prescription is universally high in contemporary practice, this is unlikely to be an important covariate. Moving the intervention closer to hospital discharge may have enhanced its benefits, since the fall-off in adherence is steepest approximately 1 month after discharge.

Readers should not be discouraged by the relatively modest reported improvement. Adherence is a complex behavior affected by a number of factors, some intrinsic to patients such as their understanding of the medication and their belief in their abilities to improve their health and some extrinsic to patients such as medication cost and regimen complexity. An intervention designed to affect only 1 of these factors would be expected to have a small effect. As pointed out by the authors, even a small improvement in adherence with β-blockers following myocardial infarction is likely to have a large effect at a population level. Other health maintenance organizations seeking to improve cardiovascular outcomes should consider adopting the strategy that Smith and colleagues have reported on, and adaptation of the strategy for other settings should be investigated.

Edward P. Havranek, MD

Correspondence: Dr Havranek, Division of Cardiology, Department of Medicine, Denver Health Medical Center, 777 Bannock St, Denver, CO 80200 (Edward.Havranek@dhha.org).

Financial Disclosure: None reported.