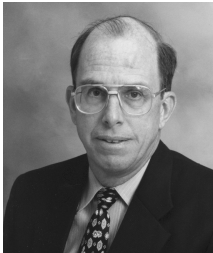


# Reducing Major Vascular Events Among VA Primary Care Patients: An Extraordinary Opportunity



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Data from randomized trials document that the frequency of major vascular events can be significantly reduced by lowering serum cholesterol and systolic blood pressure in high-risk patients. The recent publication of the Heart Protection Study (HPS) provided randomized trial evidence to support the recommendation of the National Cholesterol Education Program Adult Treatment Panel III to broaden statin use to include patients whose risk for a coronary event is equivalent to that among patients with manifest coronary artery disease, such as those with diabetes or cerebral, aortic, or peripheral vascular disease. Similarly, recent meta-analyses of hypertension trials provide us precise estimates of the benefits of lowering blood pressure. Risk and risk reduction data from these trials were applied to 153,305 Veterans Health Administration primary care patients to assess the health impact and costs of lowering cholesterol and blood pressure more aggressively in this population. Based on the results, it was estimated that 98,598 major vascular events might be prevented and \$302,074,587 saved over 5 years if all patients were treated according to the HPS criteria and the recommendations of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. It is anticipated that achieving these goals will not be possible without significant, innovative system changes, such as disease management programs with electronic chart abstraction to identify patients who do not meet these recommendations. Clinical Cornerstone Supplement 1. Copyright © 2003 Excerpta Medica, Inc.

## THE EVIDENCE FOR REDUCING MAJOR VASCULAR EVENTS

### Lowering Cholesterol

The Third Report of the National Cholesterol Education Program Adult Treatment Panel III (NCEP III) (1) recommended that patients whose risk for coronary death or nonfatal myocardial infarction

(MI) is similar to that of those with coronary artery disease (CAD) should undergo cholesterol-lowering therapy with the same goals as patients with manifest CAD. These *CAD equivalent-risk* patients include those with diabetes or aortic, cerebral, or peripheral vascular disease. The evidence was largely epidemiologic in nature.

The Heart Protection Study (HPS) (2) compared the treatment of 10,269 patients with CAD or CAD-equivalent risk randomly allocated to simvastatin 40 mg/d with that of 10,267 allocated to placebo. The primary eligibility criteria for the HPS were: (a) men or women aged 40 to 80 years; (b) nonfasting total cholesterol  $\geq 135$  mg/dL; and (c) CAD or CAD-equivalent risk. Allocation to simvastatin resulted in a 21.4% reduction in major vascular events (MVEs), which was similar among patients with and without CAD (2).

The HPS treated all eligible patients with the same dosage, rather than titrating drug therapy to reach a particular cholesterol or low-density lipoprotein cholesterol (LDL-C) goal. As a result of this design, the HPS was able to demonstrate that even patients with baseline LDL-C  $< 100$  mg/dL benefited from treatment, experiencing a reduction in MVEs proportionately similar to those with higher baseline levels. Significant reductions in MVEs were also seen in groups of patients stratified by sex, age, cigarette smoking status, treatment of hypertension, and use of aspirin, beta-blockers, or angiotensin-converting enzyme (ACE) inhibitors.

Adverse reactions that could be attributed to simvastatin therapy were minimal. The incidence of new primary cancers (except nonmelanoma skin cancer) and elevations of alanine aminotransferase were similar in simvastatin- and placebo-group patients. Elevated creatine kinase (CK) was found in 30 (0.30%) simvastatin-group patients and 19 (0.19%) placebo-group patients. Myopathy (muscle symptoms and CK  $> 10$  times the upper limit of normal) without rhabdomyolysis was diagnosed in 5 simvastatin-group patients and 1 placebo-group patient. Rhabdomyolysis (CK  $> 40$  times the upper limit of normal) occurred in 5 and 3 patients, respectively, but there were no deaths. On the other hand, complaints of muscle pain or weakness were common, reported on  $\geq 1$  occasion in 32.9% of simvastatin-group patients and 33.2% of placebo-group patients.

It has been widely assumed that all hydroxymethylglutaryl coenzyme A reductase inhibitors (ie, statins) are equivalent because they all lower cholesterol at the same step of its synthesis.

Although they may be relatively equivalent in their cholesterol lowering effects, their equivalence in preventing MVEs is unknown. A number of pieces of evidence suggest that the reduction of MVEs may occur by other mechanisms in addition to lowering cholesterol. Only simvastatin and pravastatin have been studied in randomized trials of sufficient size to assess mortality as an end point, and there have been no equivalency studies of sufficient size to evaluate mortality or MVEs as end points.

### Lowering Blood Pressure (BP)

The benefits of lowering BP in hypertensive patients have been known for  $> 35$  years, beginning with the publication of a landmark VA cooperative study (3). The findings of this early, randomized, controlled trial have been confirmed and refined by many subsequent trials. As a result, it has been possible to perform meta-analyses summarizing the results of a number of trials to precisely define the relationship between the reduction in risk of MVEs and reduction in BP. In one of the largest recent meta-analyses, Staessen et al (4) combined the results of 27 trials including 136,124 patients to demonstrate a linear relationship between systolic BP (SBP) reduction and cardiovascular mortality and a curvilinear relationship with cardiovascular events. A reduction of 10 mm Hg in SBP will produce an  $\sim 25\%$  reduction in cardiovascular mortality and an  $\sim 30\%$  reduction in cardiovascular events (4). These proportionate risk reductions are relatively independent of baseline SBP and type of antihypertensive agent administered.

Despite this wealth of data showing the benefits of treating hypertension, achieving hypertension control in large populations of patients has been surprisingly difficult. In the Second National Health and Nutrition Examination Survey conducted from 1976 to 1980, only 10% of hypertensive patients were controlled to  $< 140$  mm Hg SBP and  $< 90$  mm Hg diastolic BP (DBP) (5). The control rate increased to 23% in the Third National Health and Nutrition Examination Survey (1988–1991) (6). However, the fact that most hypertensive patients have not achieved BP control remains a major public health problem.

## AN OPPORTUNITY TO REDUCE MVEs

The VA has undergone a major transformation over the last 8 years, shifting its focus from acute illnesses and inpatient care to the ambulatory care of chronic disease and health maintenance in community-based outpatient clinics. This shift has been accompanied by an increase of  $\geq 200\%$  in the number of enrolled veterans. Despite the strains created by this increase in patients, the VA has become recognized as a leader in health care quality (7,8) and innovations in health care delivery, such as the near-universal electronic documentation of care through the use of a superb computerized patient record system (CPRS) developed within the VA (9).

### Methods

Electronic documentation of care has made it possible to develop a software tool for electronic chart abstraction as part of the VA-funded Evidence-Based Medical Record (EBMR) Project. The goals of the EBMR Project were to develop and evaluate an automated, point-of-care, clinical decision support tool that was fully integrated with our present electronic patient record. The EBMR clinical decision support focuses on the secondary prevention of coronary events among patients with CAD in primary care clinics. EBMR software was adapted to create an electronic chart abstraction tool that collects a prespecified set of standardized, encoded data from the problem list, vital signs, laboratory measurements, medications, patient demographics, care providers, and encounters recorded in CPRS and other electronic data files containing reasons for outpatient visits and hospital discharge diagnoses.

The BP measurements analyzed in this study were the mean of the 2 most recent BP recordings, as recommended by the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7) (10), unless only 1 was available. Using the JNC-7 criteria, a patient was considered to be hypertensive if SBP was  $\geq 140$  mm Hg or if DBP was  $\geq 90$  mm Hg, except for patients with diabetes or chronic renal failure, for whom cutoffs of SBP  $\geq 130$  mm Hg and DBP  $\geq 80$  mm Hg were used.

CAD was considered to be present if the patient had diagnoses with *International Classification of Diseases, Ninth Revision, Clinical Modification* codes 410 (acute MI), 411 (other ACS), 412 (previous MI), 413 (angina), 414 (coronary atherosclerosis), V45.82 (percutaneous coronary intervention, or V45.81 (CABG) recorded on the problem list, reported as a reason for an ambulatory care visit, or present in the discharge abstract. Similar criteria were used for diagnoses of cerebral, aortic, or peripheral vascular disease and diabetes.

### Calculation of Vascular Events Prevented

One of the goals of this study was to approximate the potential benefits to VA patients—balanced against the costs to the health care system—of more aggressive lowering of cholesterol and BP, as per the JNC-7 (10) recommendations and the NCEP III (1) confirmed by the HPS (2). The measure of patient benefit was an estimate of MVEs prevented. To make this calculation, it was necessary to know the risk of an MVE in VA primary care patients who did not meet these guidelines, as well as the relative risk reduction with more aggressive therapy.

Data were used from the HPS diabetes subgroup paper (11) to estimate the 5-year risk for an MVE in VA primary care patients who fit the HPS criteria and were not prescribed any statin. However, the incidence of CAD in patients meeting these criteria (46%) was substantially lower than that in the HPS (65%). Therefore, the HPS event rates (27.5% for patients with CAD, 21.1% for patients without) were applied to the proportions of patients with and without CAD, which gave an estimated 5-year MVE rate of 24.6%, slightly lower than the 25.2% event rate for placebo-treated patients in the overall HPS (2). In a similar fashion, after initiating simvastatin 40 mg/d, event rates were estimated to be 19.3% in patients—again somewhat lower than the 19.8% observed in the overall HPS.

To estimate the benefit of more aggressive BP lowering, risk data presented in the final JNC-6 report (5) were used. These data were based on a meta-analysis by McMahan and Rogers (12) of 5 hypertension trials involving 12,483 patients aged

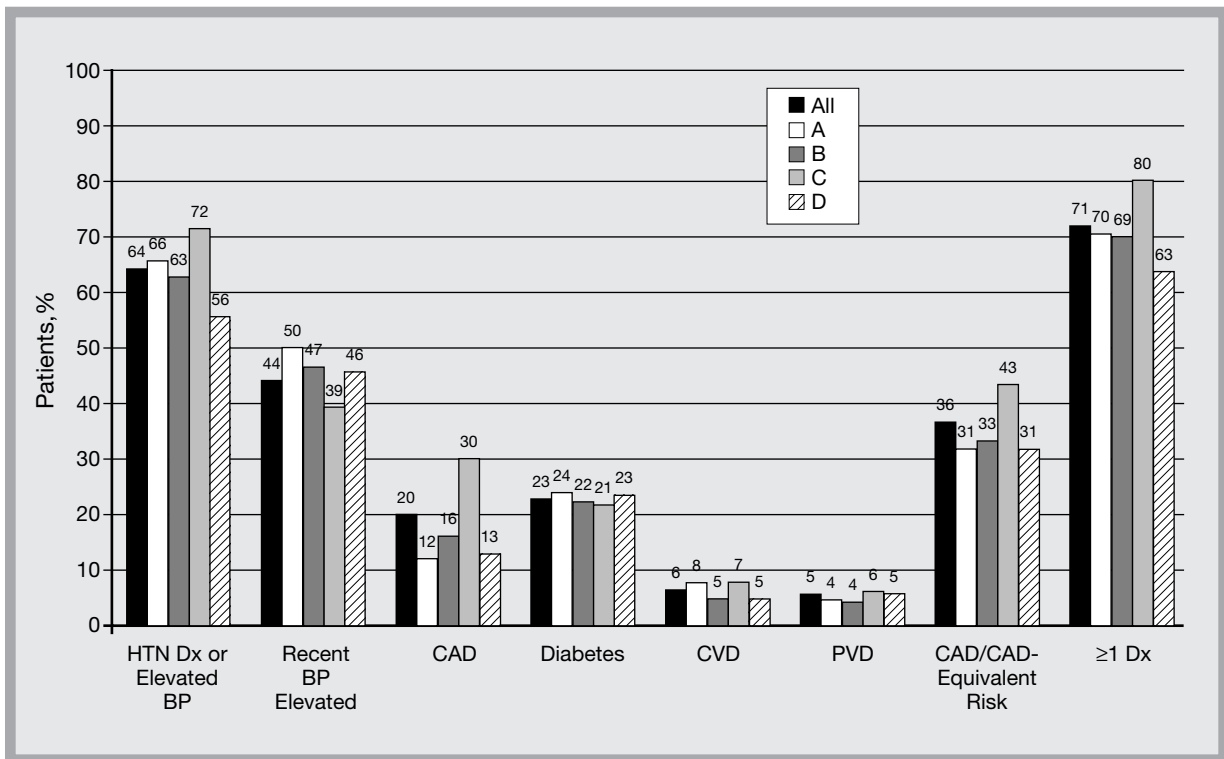
>60 years. The combined 5-year event rate for fatal and nonfatal stroke and coronary heart disease was 14.0% among the control patients and 10.2% among the intervention patients for a proportionate reduction of 27.6%. The mean SBP reduction was 12 to 14 mm Hg. This proportionate reduction was similar to the ~30% reduction in cardiovascular events with a 10 mm Hg reduction in SBP estimated from a more recent meta-analysis by Staessen et al (4) of 136,124 patients from 27 trials.

**Results**

An electronic chart abstraction was performed for all 153,305 patients with ≥1 primary care visit from April 2002 to March 2003 in health care delivery facilities in 4 Veterans Integrated Service Networks. The **figure** shows an analysis of the most recent available data relevant to risk for an MVE for these patients. A diagnosis of hyperten-

sion (or elevated BP) was present in 64% of all patients in primary care; among 69% of these (44% of all patients), the mean of the 2 most recent BP measurements was in the hypertensive range according to JNC-7 criteria (10). One or more of these diagnoses was present in 71% of VA patients in primary care. There can be little doubt that VA primary care patients are at very high risk for developing an MVE.

In subsequent analyses, the focus was on the 62,129 patients with CAD or CAD-equivalent risk and the 67,485 patients with hypertensive BPs. As is typical of VA patients, they were predominantly male (97%) and of older age (mean, 68.6 years). By most standards, the mean SBP (148.5 mm Hg among hypertensives) and mean serum LDL-C (100.3 mg/dL among patients with CAD or CAD-equivalent risk) were only mildly elevated, if at all. However, as shown in the following subsection, opportunities



**Figure.** The incidence of cardiovascular diagnoses and diabetes among 153,305 Veterans Health Administration (VA) patients receiving primary care at 4 facilities participating in the Evidence-Based Medical Record Project. HTN = hypertension; Dx = diagnosis; CAD = coronary artery disease; CVD = cerebral vascular disease; PVD = peripheral vascular disease; CAD-equivalent risk = risk of major vascular event comparable to that of patients with coronary artery disease (ie, those with diabetes, cerebral vascular disease, aortic disease, or peripheral vascular disease). A = VA site A; B = VA site B; C = VA site C; D = VA site D.

remain for improving both BP and cholesterol control; such improvements carry a high likelihood of considerably reducing MVEs.

## CHOLESTEROL MANAGEMENT – HOW ARE WE DOING?

NCEP III recommended that patients with CAD or CAD-equivalent risk maintain LDL-C <100 mg/dL and undergo annual LDL-C measurement (1). Overall, 50% of VA primary care patients meeting these population criteria had an LDL-C <100 mg/dL, 81% had an LDL-C measurement within the last year, and 44% (ranging by site from 35% to 52%) met both criteria.

It is only fair to note that the guidelines developed jointly by the VA and the US Department of Defense (DoD) recommended LDL-C <120 mg/dL and an LDL-C measurement interval <2 years for patients with CAD. The reason for the differences between the VA and NCEP III guidelines is that the former were developed prior to the publication of the HPS (2). The dyslipidemia guideline expert panel of the VA and DoD required large-scale, randomized trial data to support their recommendations; the VA guidelines are currently being revised. Overall, 73% of VA patients in primary care meet the VA-DoD guidelines for cholesterol management.

## Benefits to VA Patients of More Aggressive Cholesterol Lowering

Data from the HPS were used to estimate the numbers of MVEs that could be prevented if all patients in VA primary care who meet the HPS eligibility criteria (2) received simvastatin 40 mg/d. Twenty-eight percent of VA primary care patients met the HPS criteria, and 39% of these patients (11% of all primary care patients) were not taking a statin.

As shown in **Table I**, the risk data derived from the HPS were combined with population data to estimate the number of vascular events that might be prevented if eligible patients not taking any statin were treated with simvastatin 40 mg/d for 5 years. It was estimated that ~4,290,000 patients are enrolled in primary care VA-wide, based on a total enrollment of 6,757,528 as of March 2003 and the assignment of 63% of enrolled

patients in the VA Eastern Colorado Health Care System (ECHCS) to primary care (Judi Guy, RN, Administrative Assistant to the Chief of Staff, Denver VA Medical Center, oral communication, August 19, 2003). We estimated that administering simvastatin 40 mg/d for 5 years to the 335,429 patients in primary care VA-wide who meet the HPS criteria and are not taking a statin could prevent 25,377 MVEs. The number needed to treat (NNT) to prevent 1 MVE is 18.9.

## BLOOD PRESSURE MANAGEMENT – HOW ARE WE DOING?

JNC-7 (10) recommends that everyone maintain SBP <140 mm Hg and DBP <90 mm Hg—except patients with diabetes or chronic renal failure, for whom SBP <130 mm Hg and DBP <80 mm Hg are recommended. As shown in the **figure**, the mean of the 2 most recent BPs exceeded the JNC-7 criteria in 67,485 (44%) of the 153,305 primary care patients in the current analysis. A surprising 81% were not taking a thiazide diuretic, as recommended by JNC-7 and based on the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (13). No diuretic of any type was prescribed for 72% of hypertensive patients, and none of the following classes of antihypertensive agents were prescribed for 30%: diuretics, beta-blockers, ACE inhibitors, angiotensin receptor blockers, or calcium channel blockers.

**Table II** shows calculations to estimate the potential number of vascular events that could be prevented with an SBP reduction of 12 to 14 mm Hg. Again, it was estimated that there were 4,290,000 veterans in primary care VA-wide; arriving at a figure of 1,888,462 hypertensive patients, assuming that the 44% of our 153,305 patients whose mean of the 2 most recent BP measurements exceeded JNC-7 criteria (10) would apply to the VA as a whole. It was also assumed that 5-year event rates for coronary heart disease and stroke reported in the JNC-6 final report (5) would apply to hypertensive patients in the VA. Given these assumptions, it was estimated that 73,221 MVEs might be prevented by lowering SBP by 12 to 14 mm Hg for 5 years. The NNT to prevent 1 MVE was 26.3.

**TABLE I. ESTIMATION OF MAJOR VASCULAR EVENTS (MVEs) PREVENTED THROUGHOUT THE VA BY TREATING PATIENTS MEETING THE HPS CRITERIA WITH SIMVASTATIN 40 MG/D FOR 5 YEARS**

<i>Variable</i>	<i>Patients</i>		<i>5-Year MVE Risk</i>	<i>Estimated MVEs VA-Wide per 5 Years, no.</i>
	<i>Present Analysis, no. (%)</i>	<i>Projected VA-Wide, no.</i>		
HPS criteria				
CAD/CAD-equivalent risk	62,129 (41)	1,738,583		
Total cholesterol $\geq$ 135 mg/dL	125,489 (82)	3,511,613		
Aged 40 to 80 years	126,356 (82)	3,535,874		
Meet all HPS criteria	42,667 (28)	1,193,969		
Meet all HPS criteria and not taking a statin	17,141 (11)	479,664	0.246*	117,786
Initiate statin	17,141 (11)	479,664	0.193*	92,409
MVEs prevented				25,377

\*Computed using event rates for patients with and without CAD provided in the HPS diabetes subgroup paper (11) and the prevalence of CAD in HPS patients and our VA patients meeting HPS criteria, who were not taking simvastatin.

**TABLE II. ESTIMATION OF MAJOR VASCULAR EVENTS PREVENTED WITH SYSTOLIC BLOOD PRESSURE REDUCTION OF 12 TO 14 MM HG AMONG HYPERTENSIVE PATIENTS**

	<i>Hypertensive Patients, no.</i>		<i>5-Year Stroke/CHD Risk</i>	<i>Estimated 5-Year Stroke/CHD Events VA-Wide, no.</i>
	<i>Present Analysis</i>	<i>Projected VA-Wide</i>		
Hypertensive patients	66,706	1,888,462	0.140	265,048
12 to 14 mm Hg SBP reduction	66,706	1,888,462	0.102	191,827
Stroke/CHD events prevented				73,221

VA = Veterans Health Administration; CHD = coronary heart disease (ie, coronary death or nonfatal myocardial infarction); SBP = systolic blood pressure.

### Informal Cost Estimates

Costs were not formally analyzed, but data suggested that further lowering of cholesterol and BP would be cost-neutral or even produce savings as a result of fewer hospitalizations for MVEs. It was assumed that this therapy could be delivered within the current primary care system without additional personnel costs, and considered only the additional drug costs counterbalanced by reductions in hospitalization costs for MVEs prevented. The first of these assumptions may not have been correct because structural changes in the primary care system may be needed to achieve the recommended treatment goals.

To obtain an approximate estimate of costs to the health care system, ECHCS costs for simvastatin 40 mg (\$0.479/half of an 80-mg tablet, which affords a cost saving) and hydrochlorothiazide 25 mg (\$0.017/tablet) were used (Gerry Marmon, Chief Pharmacy Service, ECHCS, written communication, May 2003) together with Medicare reimbursement rates for hospitalization for MVEs posted on the Medicare Web site (14). The weighted mean reimbursement rate for these diagnosis-related groups (DRGs) was ~\$7911. Thus, the informal cost analysis suggests an estimated savings of \$302,074,587 over 5 years (Table III).

**TABLE III. COST ESTIMATES FOR MORE AGGRESSIVE LOWERING OF CHOLESTEROL AND BLOOD PRESSURE**

<i>Cost Item</i>	<i>Unit Cost, US \$</i>	<i>Patients, no.</i>	<i>Hospitalizations, no.</i>	<i>VA-Wide Cost per 5 Year, US \$</i>
Hydrochlorothiazide 25 mg	-0.017*	1,888,462		-58,589,530
Simvastatin 40 mg	-0.479†	479,664		-419,310,280
Major vascular event hospitalizations prevented	7911		98,598	779,974,397
Net				302,074,587

\*VA Computerized Patient Record System, version 3 AD. †Medicare Web site (14).

## DISCUSSION

Our analyses suggest that there is an extraordinary opportunity to improve the outcomes of VA patients at risk for MVEs, and that this may be achievable with an overall cost savings. We arrived at this result by combining data from 153,305 VA primary care patients with risk and benefit estimates from the HPS (2,11) and 2 meta-analyses of hypertension therapy (4,12). Nearly 100,000 MVEs could be prevented over 5 years if all patients were treated according to NCEP III (1), the HPS (2), and JNC-7 (10) criteria. We also estimated cost savings to the VA of >\$300,000,000 over 5 years as a result of fewer hospitalizations for MVEs. However, we made a number of assumptions in arriving at these figures that might affect the validity of our conclusions.

### Risk Estimates

Because of their large populations, the estimated risks of MVEs from the HPS and the meta-analyses of hypertension therapy are likely to be quite precise for the patients studied. The issue is whether VA patients, as defined in our analyses, have similar risks. Although we used the HPS entry criteria to select our patients for simvastatin therapy, it is clear that the distribution of risk factors is not the same. For example, the HPS has a higher proportion of patients with CAD. Despite our adjustments for the differences in the prevalence of CAD, it is likely that there are other differences in important risk factors (eg, cigarette smoking) that could affect our risk estimates. This reasoning also applies to the use of risk estimates from hypertension meta-analyses to analyses of VA patients. However, because these risk

data were generated from multiple individual studies, they are more likely to be generalizable.

### Additive Benefits

Epidemiologic studies (eg, the Framingham Study) (15) have shown elevated cholesterol and hypertension to be independent risk factors for the development of CAD. However, an additive benefit of lowering cholesterol and BP has not been shown in a randomized, controlled trial. Fifty-one percent (8816/17,141) of our patients eligible for simvastatin therapy (according to the HPS criteria) were also hypertensive. If one assumes the unlikely extreme case that there is no additive benefit whatsoever, the number of vascular events prevented would be reduced by 13.2% from 98,598 to 85,546. This modest diminution in MVEs prevented by assuming no additive effect of simvastatin and anti-hypertensive therapy in patients eligible for both does not change our major conclusions.

### Hospitalization Costs

This was not a formal cost study, but to garner some idea of the cost implications of our finding, we used the weighted mean of median DRG reimbursement rates for MVEs to approximate VA hospitalization costs. However, our analysis did not account for physical plant and administrative costs, which are unlikely to change quickly in response to fewer MVE hospitalizations. This may be partly counterbalanced by the fact that Medicare DRG reimbursement rates do not include physician costs.

### Achieving Recommended Treatment Goals

By far, our weakest assumption was that 100% of

patients would be treated according to NCEP III (1), the HPS (2), and JNC-7 (10) criteria. One of the great unsolved problems in health care delivery is how to effectively and efficiently implement evidence-based, clinical practice guidelines. Our experience with instituting a VA-wide, risk-adjusted, outcomes-driven quality improvement program (16), measuring processes, structures, and outcomes of care (17), and conducting a randomized trial of automated clinical decision support (EBMR) over the last 15 years has left us with several conclusions:

- Changing care provider behavior is very difficult.
- Evidence-based, clinical practice guidelines—although necessary—are not sufficient to effect changes in health care delivery.
- Automated, point-of-care, clinical decision support—although potentially useful—has not yet been demonstrated to be effective in a large, multicenter, randomized trial.
- Placing further demands on primary care providers, regardless of potential benefit to our patients, is likely to be counterproductive.

Let us examine the latter point in more depth. The VA, like many health maintenance organizations, has placed a major emphasis on primary care in the last decade with the hope that primary and secondary prevention in an older population with a high prevalence of chronic diseases would both improve patient outcomes and be cost-effective. To a significant extent, the VA has been more successful than the private sector in implementing these prevention strategies (7). However large gaps remain between knowledge of what kinds of care work and how to deliver that care. Why?

The answer to this question is as complex and unfathomable as human behavior—both that of health care providers and that of patients. However, we propose that an important reason is that the health care system is placing nearly impossible time demands on care providers, particularly primary care providers. Yarnall et al (18) estimated that the physician time required to provide all services recommended by the US Preventive Services Task Force, at the recommended frequency, to a represen-

tative patient panel of 2500 would require *7.4 hours every working day*. This leaves no time for the health care provider to deal with the concerns the patient brought to the visit—the arthritic knee, the fatigue and sense of hopelessness of untreated depression, or the increasingly incapacitated spouse.

On the other hand, clinical trials rarely achieve 100% of their stated treatment goal. For example, in the HPS an average of 17% of placebo-allocated patients were taking a statin and an average of 85% of simvastatin-allocated patients took the drug over the 5 years of the study (2). Thus, about one third (17% plus 15%) of patients had crossed over from the assigned treatment arm. This would have the result of underestimating the actual treatment benefit by about one third. Thus, the observed 24% reduction in MVEs would have been closer to 35% if there had been 100% concordance with treatment. We conclude that the estimated 25,377 MVEs prevented VA-wide over 5 years with simvastatin would be correct if only two thirds of patients complied with recommended treatment.

However, the same reasoning cannot be applied to hypertension treatment, as we based our treatment benefit on an average 12 to 14 mm Hg reduction in systolic pressure in all patients (5). If this systolic pressure reduction were achieved in just two thirds of hypertensive patients, the estimated number of MVEs prevented would be about 48,814.

Even if we were successful in treating only ~50% of the patients eligible for more aggressive cholesterol and BP lowering, we would still prevent ~49,000 MVEs over 5 years with a potential cost savings of ~\$150,000,000—clearly a worthwhile achievement.

### The Need for System Change

We theorize that placing further demands on primary care providers would only further alienate an already harassed group of care providers, and would be unlikely to achieve our treatment goals. All the tools to change care provider behavior available to us (eg, continuing medical education, creation and dissemination of evidence-based clinical practice guidelines, audit and feedback, aca-

demic detailing, clinical decision support) are unlikely to work collectively and certainly not singly if care providers do not have the time to do their work. Major changes at the system level would seem to be needed. What might work?

Because the duration of primary care visits seems to be a major factor (18), increasing the length of the primary care visit from 15 or 20 minutes to 30 or even 40 minutes for complex patients might be effective, although costly. An alternative would be to provide primary care providers with electronic feedback of lists of their patients who are hypertensive or eligible for simvastatin, as well as time to call patients to adjust antihypertensive medications or request that they come in for fasting lipid measurements. A third alternative would be to establish disease management programs with less expensive nonphysician health care providers (eg, nurses, pharmacists) who are responsible only for BP control or cholesterol management of outlier patients identified by electronic chart abstraction.

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