

Analysis of the Degree of Undertreatment of Hyperlipidemia and Congestive Heart Failure Secondary to Coronary Artery Disease

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There is a lack of data evaluating the implementation of guidelines in the management of coronary artery disease (CAD) or congestive heart failure (CHF) in the outpatient setting. We analyzed an administrative data set from the Merck & Co. sponsored national Quality Assurance Program, a retrospective outpatient chart audit of 58,890 adult outpatients from 140 medical practices (80% cardiology only) in the USA with diagnoses of CAD and/or CHF identified from medical claims data. We determined the (1) frequency of lipid documentation and prescription of lipid-lowering agents in patients with CAD, (2) frequency of assessment of left ventricular function and prescription of an angiotensin-converting enzyme inhibitor in patients with CHF, and (3) predictors of medication prescription. Of the 48,586 patients with CAD, 44% had annual diagnostic testing of low-density lipoprotein cholesterol. Only 25% of these patients

reached the target low-density lipoprotein cholesterol of ≤ 100 mg/dl, and only 39% were taking lipid-lowering therapy, which was less among the elderly than in the younger patients. Of the 16,603 patients with CHF, 64% had diagnostic testing of left ventricular function, and 50% of patients were taking an angiotensin-converting enzyme inhibitor; 67% of patients received medication if they had documented systolic dysfunction. Significant predictors of medication prescription included diagnostic testing, younger age, history of myocardial infarction or coronary artery bypass grafting, hypertension, cardiology specialty, and geographic region. Thus, current practice patterns in the management of CAD and CHF are inadequate. Patient age, diagnostic testing, and practice environment influence medication prescription.

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Cardiovascular disease is the leading cause of death in the United States. Each year 900,000 Americans have an acute myocardial infarction; of them, 225,000 die.¹ Coronary artery disease (CAD) is the most common cause of congestive heart failure (CHF) in the developed world, accounting for 50% of cases.² It is estimated that 4.9 million Americans have CHF, and it is the leading reason for hospital admission in patients aged ≥ 65 years.^{2,3} There are widely accepted evidence-based national guidelines for the measurement and treatment of hyperlipidemia^{4,5} and left ventricular dysfunction.^{6,7} Physician adherence to these guidelines remains low. Previous studies report that only 8% to 39% of patients with hyperlipidemia are treated⁸⁻¹² and that 37% to 73% of patients hospitalized with CHF are discharged with a prescription for an angiotensin-converting enzyme (ACE) inhibitor.¹³⁻¹⁵ Most of these studies report data collected before publication of the National Cholesterol Education Program Adult Treatment Panel II and American

Heart Association/American College of Cardiology guidelines^{4,5} for managing CAD patients, and the Agency for Health Care Policy and Research guideline for evaluating and treating patients with systolic dysfunction.⁶ This study compares physician management of outpatients with CAD and/or CHF with that recommended by national guidelines, and examines predictors of the prescription writing of lipid-lowering and ACE inhibitor therapy.

METHODS

Selection of practices and patients: The Quality Assurance Program is a national endeavor, established and funded by Merck & Co., Inc., to promote evidence-based best practices beginning with an initiative to profile physician practice patterns related to the medical management of patients with CAD and/or CHF in accordance with accepted guidelines.⁴⁻⁷ The practices included in this study were identified by Medilink Internal Medicine Specialists National Therapeutic Index (Plymouth Meeting, Pennsylvania) as high users of lipid-lowering medication and ACE inhibitor therapy, which were based on the total number of prescriptions written per physician. Under a contract with Merck, ACCESS Medical Ltd. (Arlington Heights, Illinois) reviewed patient billing information, performed medical record abstractions, and maintained confidentiality agreements with all participating practices. The analysis of the aggregate data was per-

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formed at Medical Review of North Carolina. The collaborative group had no direct access to any medical records. Details of the method used have been previously published.¹⁶ Of the 274 participating practices, representing 125,433 patient records, 140 sites agreed to include blinded data from their patients in the aggregate analysis. Criteria for the study sample analyzed included: an ICD-9 diagnosis code consistent with CAD (410-414) or CHF (428), age ≥ 21 years, and a minimum of 2 office visits within a 12-month period (last visit between July 1, 1994, and October 1, 1996). Geographically, 47% of practices were in the South, 21% in the Northeast, 17% in the Midwest, and 15% in the West. Most participating practices (80%) were cardiology-only practices.

Cardiac medications: The percentage of patients taking a starting dose of a 3-hydroxy-3-methylglutaryl coenzyme-A (HMG-CoA) reductase inhibitor was determined. Recommended starting doses of HMG-CoA reductase inhibitors were obtained from the Physician's Desk Reference¹⁷ and included: lovastatin 20 mg, pravastatin 20 mg, simvastatin 10 mg, fluvastatin 20 mg. Based on the efficacy of lowering low-density lipoprotein (LDL) cholesterol (using the following conversions of total daily doses: lovastatin/1, pravastatin/1, simvastatin $\times 2$, and fluvastatin/2), a comparable dose was determined.¹⁸ The percentage of patients on a target dose of an ACE inhibitor was also calculated. Target daily doses of an ACE inhibitor were based on mortality trial data (enalapril 20 mg, captopril 150 mg, ramipril 10 mg), and guideline recommendations (lisinopril 20 mg, quinapril 40 mg, and fosinopril 20 mg).^{6,7,19} Based on the conversion of total daily doses (enalapril/1, captopril/7.5, lisinopril/1, ramipril $\times 2$, quinapril/2, and fosinopril/1), a comparable dose was determined. Target doses were not available for benazepril or moexipril.

Data analysis: The final data set included abstracts from 58,890 patient charts. Individual practices, physicians, and patients were not identified in the analysis. Data are presented as mean \pm SEM unless otherwise indicated. Logistic regression was used to determine the predictors of the prescription of lipid-lowering and ACE inhibitor therapy. The following variables were considered potential predictors: age, gender, history of diabetes, hypertension, myocardial infarction, coronary artery bypass grafting, LDL cholesterol documentation, left ventricular ejection fraction $< 40\%$, physician specialty, and geographic region of the country based on the US Census Bureau designation. The data analysis was performed at Medical Review of North Carolina, using SAS for Windows (version 6.11; SAS Institute Inc., Cary, North Carolina).

RESULTS

The total population of 58,890 patients included 83% with CAD and 28% with CHF. There was some overlap, with 10% of patients having both CAD and CHF.

TABLE I Characteristics of Patients With Coronary Artery Disease (n = 48,586)

Age (yr) (mean \pm SEM)	68 \pm 0.1
Women	17,669 (36%)
Systemic hypertension (history)	21,090 (43%)
Diabetes mellitus (history)	8,894 (18%)
Previous myocardial infarction	14,178 (29%)
Coronary artery bypass grafting	14,260 (29%)
Documented CAD*	37,134 (76%)

*Chart documentation of myocardial infarction, coronary artery bypass grafting, angioplasty, stent, atherectomy, angina, or atherosclerotic heart disease.

Patients with coronary artery disease: LIPID ASSESSMENT AND PRESCRIPTION OF LIPID-LOWERING THERAPY: Characteristics of the 48,586 patients with CAD are listed in Table I. A total cholesterol level was documented for 66% of CAD patients, and only 44% of patients had a chart-documented LDL cholesterol within 1 year of their last visit. The mean total cholesterol and LDL cholesterol were 202.9 \pm 0.3 mg/dl (n = 31,744) and 123.8 \pm 0.3 mg/dl (n = 20,878), respectively. Although 61% of patients with an available LDL cholesterol value were at the 1988 National Cholesterol Education Program goal LDL cholesterol (< 130 mg/dl),²⁰ only 25% of patients were at the 1993 National Cholesterol Education Program Adult Treatment Panel II target (≤ 100 mg/dl).⁴ HMG-CoA reductase inhibitors were prescribed in 84% of patients, and a few patients received fibric acid (13%), niacin (8%), and bile resins (3%). However, 65% of CAD patients receiving an HMG-CoA reductase inhibitor were on a starting dose. There was no relation between LDL cholesterol and the percentage of patients at a starting dose of an HMG-CoA reductase inhibitor or between LDL cholesterol and the mean dose of the HMG-CoA reductase inhibitor prescribed.

Figure 1 displays the unadjusted relation between age and gender on the prescription of lipid-lowering therapy. The percentage of patients who received a prescription for medication was greatest in the group aged 55 to 64 years. There was a marked decline in prescription of therapy with advancing age. The age of the patient also appeared to determine the impact of gender on the prescription of lipid-lowering therapy. Women < 65 years old were treated less often than men, but this difference declined with age.

Table II presents the odds ratios for the predictors of the prescription of lipid-lowering therapy. Patients were 4 times more likely to receive therapy if LDL cholesterol was documented. History of myocardial infarction or coronary artery bypass grafting, hypertension, region of the country, and cardiology specialty were all associated with increased therapy.

Patients with congestive heart failure: ASSESSMENT OF LEFT VENTRICULAR FUNCTION AND ACE INHIBITOR USE: There were 16,603 patients with a diagnosis of CHF. The patient characteristics of this group are presented in Table III. Assessment of left ventricular function was documented in 64% of charts. The mean left ventricular ejection fraction was 45 \pm 0.2%.

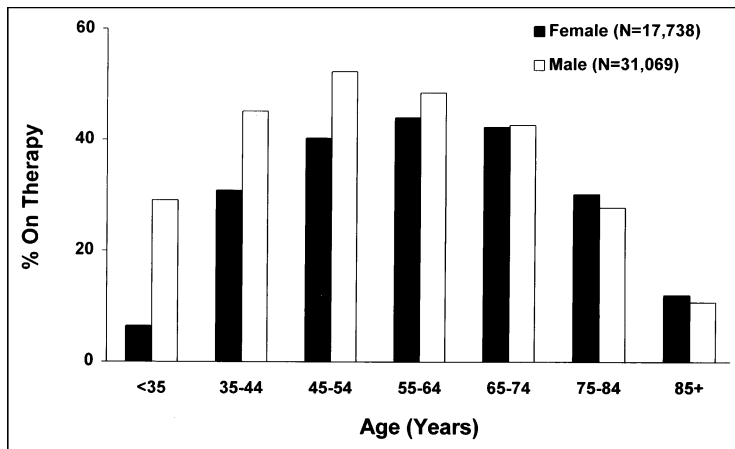


FIGURE 1. The effect of gender and age on the prescription of lipid-lowering therapy in CAD patients.

	Odds Ratio	95% Confidence Intervals
Age (yr)*		
75+	0.42	0.40–0.45
65–74	0.84	0.79–0.88
45–54	1.11	1.03–1.19
<45	0.88	0.69–0.88
Male gender	0.97	0.93–1.01
LDL documented	4.10	3.94–4.27
Myocardial infarction or coronary artery bypass grafting	1.36	1.30–1.41
Hypertension	1.09	1.05–1.14
Diabetes mellitus	0.98	0.93–1.03
Cardiology specialty	1.32	1.26–1.40
Region†		
Midwest	1.39	1.31–1.47
Northeast	1.11	1.06–1.17
West	1.06	1.00–1.27

*Compared with patients aged 55 to 64 years.
†Compared with the South.

Age (yr) (mean ± SEM)	73 ± 0.1
Women	7,637 (47%)
Systemic hypertension (history)	6,985 (43%)
Diabetes mellitus (history)	3,968 (24%)
Myocardial infarction	3,604 (22%)
Coronary artery bypass grafting	3,561 (22%)
Documented CAD*	8,972 (55%)

*Chart documentation of myocardial infarction, coronary artery bypass grafting, angioplasty, stent, atherectomy, angina, or atherosclerotic heart disease.

Overall, 50% of CHF patients were prescribed an ACE inhibitor, 67% with documented systolic dysfunction. The predictors of ACE inhibitor therapy were similar to those of lipid-lowering therapy. Patients were 2.6 times more likely to be prescribed an ACE inhibitor if left ventricular function was <40%. Previous myocardial infarction or coronary artery by-

pass grafting, history of hypertension, region of the country, and cardiology specialty of the physician predicted use of ACE inhibitor therapy. Additionally, diabetes was also a significant predictor of ACE inhibitor utilization. Although older age was associated with fewer prescriptions of ACE inhibitor therapy, the effect was less pronounced than that we observed with lipid-lowering therapy. In contrast to prescribing lipid-lowering agents, men were more likely to receive a prescription for an ACE inhibitor than women across all age groups. Table IV shows the average daily doses of ACE inhibitor used for management of CHF and the percentage of patients on a target dosage. Overall, only 26% of CHF patients were receiving the recommended target dose of ACE inhibitor.

DISCUSSION

Patients with coronary artery disease: Previous studies have reported that even in high-risk CAD patients, lipid measurement and use of lipid-lowering medication is low.^{9,12,21,22} However, these studies focused on lipid assessment and therapy in hospitalized or rehabilitation patients. There are few studies of community outpatient usage of lipid-lowering therapy in CAD patients. In the National Ambulatory Care Survey in 1991 to 1992, the rate of cholesterol testing was estimated to be only 25% of 13 million outpatient visits of patients with cardiovascular disease.⁸ We report current outpatient practice of predominantly cardiology specialty practices in the USA. During a 1-year period, LDL cholesterol was documented in 44% of patients with CAD. In addition to the test not being ordered, documentation of this test at another site—in the hospital, in the primary care office, or other specialty office—or failure of the report to be placed in the chart may be reasons why the LDL cholesterol level was not in the outpatient chart.

Overall, only 39% of patients with CAD in our study were treated with a lipid-lowering agent. Documentation of diagnostic testing of LDL cholesterol may be a rate-limiting step in the initiation of guideline recommended therapy. Patients were 4 times more likely to receive lipid-lowering therapy if LDL cholesterol was documented in the medical record. Patients aged ≥65 years was also associated with fewer prescriptions. Compared with patients aged 55 to 64 years, patients aged >75 were 58% less likely to receive lipid-lowering medication. Although the perception that older patients do not benefit from lipid-lowering therapy may exist, subgroup analysis of controlled trials does not support this view.^{23,24} The results of these studies may need to be more widely disseminated. Surprisingly, the youngest patients, aged <45 years, were also less likely to receive therapy. Reasons for this undertreatment need to be better understood. The region of the country and the specialty of the physician also predicted use of lipid-lowering therapy.

TABLE IV ACE Inhibitor Doses in Patients With Congestive Heart Failure

	Mean Daily Dose (mg)	Percentage on Target Dose
Enalapril (n = 2,987)	12.3 ± 0.2	28%
Captopril (n = 1,931)	57.5 ± 1.1	12%
Lisinopril (n = 1,856)	14.9 ± 0.3	38%
Ramipril (n = 60)	8.9 ± 1.0	48%
Quinapril (n = 485)	18.2 ± 0.6	18%
Fosinopril (n = 284)	14.5 ± 0.6	32%
All ACE inhibitors* (n = 7,603)	11.7 ± 0.1	26%

*Comparable dose (see text).
Data are presented as mean ± SEM and percentage of patients.

This suggests that in addition to patient characteristics, practice environment has an impact on the management of these patients. Interventions may need to focus more on a systems approach that would identify patients who would benefit from therapy and encourage appropriate diagnostic testing and prescription of medication.

There are few data available on the proportion of patients in the community with CAD who achieve their LDL cholesterol goal.^{25,26} Unfortunately, the low percentage of patients at their LDL cholesterol goal (25%) may overestimate the actual rate because the practices chosen were frequent prescribers of HMG-CoA reductase inhibitors and only 44% of the CAD patients had a documented LDL cholesterol on the physicians' chart. We also examined the dosing of HMG-CoA reductase inhibitors. Most patients received starting dosages and were not titrated to the doses associated with reduced morbidity and mortality in clinical trials. This helps explain why only 25% of patients were at their goal LDL cholesterol.

Patients with congestive heart failure: Previous studies documented that assessment of left ventricular function occurred in 35% to 59% of patients with CHF.^{13,15,27} In our study, 64% of patients with CHF had documentation of left ventricular function. Studies in patients hospitalized with CHF demonstrated increased prescription of ACE inhibitor therapy over time.^{13-15,27,28} However, there are few studies of community outpatient usage of ACE inhibitor therapy in CHF patients. In the National Ambulatory Care Survey in 1991 to 1992, only 30% of prescriptions were for an ACE inhibitor in 16,968 office visits for CHF patients ≥65 years.²⁹ We report an increased prescription rate of ACE inhibitor therapy, 50%, in 16,603 outpatients seen with a diagnosis of CHF in 1994 to 1996. Similar to CAD patients, documentation of diagnostic testing was an important predictor of medication prescription in CHF patients. Patients were 2.6 times more likely to be prescribed an ACE inhibitor if left ventricular function was <40%. However, management remains suboptimal. There are also few data available on dosing of ACE inhibitor in outpatients.^{13,27} We found that only 26% of outpatients achieved the recommended target dose. This suggests that the beneficial effects of ACE inhibitor therapy

reported in clinical trials may not be fully realized in clinical practice.

Study limitations: There are several limitations of this retrospective study, which make it difficult to precisely determine compliance with expert guidelines in clinical practice. Practices were not randomly selected, but were mainly cardiology and specialty practices with high rates of prescription for a HMG-CoA reductase inhibitor or ACE inhibitor. This could result in the selection of large practices. Only practices that consented were included. The cohort is not representative of the typical primary care practice and we may overestimate the adherence with national guidelines. The cohort may also not be representative of all patients with CAD or CHF since administrative claims data and ICD-9 diagnosis codes were used. However, in addition to ICD-9 diagnosis codes of CAD or CHF, chart documentation of CAD, i.e., diagnoses of myocardial infarction, coronary artery bypass grafting, angioplasty, stent, atherectomy, angina, or atherosclerotic heart disease were available for 76% of CAD patients. CHF or cardiomyopathy was documented in the charts of 42% of CHF patients.

Information on race, renal function, contraindications, and adverse reactions to medications, and dietary counseling were also not available. Our data therefore represent the total number of patients receiving medication, not necessarily the ideal candidates for therapy. Moreover, diagnostic testing may have been done but not recorded, or documented in other sources such as inpatient records. We also recognize that there is latitude in the guidelines for initiating lipid-lowering therapy in patients with a LDL cholesterol between 100 and 130 mg/dl. Finally, our data were collected between 2 and 4 years ago, and physician management may have improved since then. Nonetheless, these results show opportunities for improvement in the evaluation and management of patients with CAD and/or CHF.

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1. Ryan TJ, Anderson JL, Antman EM, Braniff BA, Brooks NH, Califf RM, Hillis LD, Hiratzka LF, Rapaport E, Riegel BJ, Russell RO, Smith EE III, Weaver WD. ACC/AHA guidelines for the management of patients with acute myocardial infarction: a report of the American College of Cardiology/American Heart Association Task Force on practice guidelines (Committee on Management of Acute Myocardial Infarction). *J Am Coll Cardiol* 1996;28:1328-1428.
2. Cowie MR, Mosterd A, Wood DA, Deckers JW, Poole-Wilson PA, Sutton GC, Grobbee DE. The epidemiology of heart failure. *Eur Heart J* 1997;18:208-225.
3. Heart and Stroke Facts: 1998 Statistical Supplement. Dallas, Texas: American Heart Association;1997.
4. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Summary of the second report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult Treatment Panel II). *JAMA* 1993;269:3015-3023.
5. Smith SC, Blair SN, Criqui MH, Fletcher GF, Fuster V, Gersh BJ, Gotto AM, Gould KL, Greenland P, Grundy SM, Hill MN, Hlatky MA, Houston-Miller N, Krauss RM, LaRosa J, Ockene IS, Oparil S, Pearson TA, Rapaport E, Starke RD,

- for the Secondary Prevention Panel. Preventing heart attack and death in patients with coronary disease. *Circulation* 1995;92:2-4.
6. Konstam, MA, Dracup, K, Baker DW, Bortorff MB, Brooks NH, Dacey RA, Dunbar SB, Jackson AB, Jessup M, Johnson JC, Jones RH, Luchi RJ, Massie BM, Pitt B, Rose EA, Rubin LJ, Wright RF, Hadorn DC. Heart failure: Management of patients with left-ventricular systolic dysfunction. Quick Reference Guide for Clinicians No. 11. AHCPR Publication 94-0613. Rockville, MD: Agency for Health Care Policy and Research, Public Health Service, U.S. Department of Health and Human Services. June 1994.
 7. ACC/AHA Task Force. Guidelines for the evaluation and management of heart failure. *J Am Coll Cardiol* 1995;25:1376-1398.
 8. Stafford RS, Blumenthal D, Pasternak RC. Variations in cholesterol management practices of U.S. physicians. *J Am Coll Cardiol* 1997;29:139-146.
 9. The Clinical Quality Improvement Network (CQIN) Investigators. Low incidence of assessment and modification of risk factors in acute care patients at high risk for cardiovascular events, particularly among females and the elderly. *Am J Cardiol* 1995;76:570-573.
 10. Nieto FJ, Alonso J, Chambless LE, Zhong M, Ceraso M, Romm FJ, Cooper L, Folsom AR, Szklo M. Population awareness and control of hypertension and hypercholesterolemia: The atherosclerosis risk in communities study. *Arch Intern Med* 1995;155:677-684.
 11. Giles WH, Anda RF, Jones DH, Serdula MK, Merritt RK, DeStefano F. Recent trends in the identification and treatment of high blood cholesterol by physicians: Progress and missed opportunities. *JAMA* 1993;269:1133-1138.
 12. Cohen MV, Byrne M-J, Levine B, Gutowski T, Adelson R. Low rate of treatment of hypercholesterolemia by cardiologists in patients with suspected and proven coronary artery disease. *Circulation* 1991;83:1294-1304.
 13. Hillis GS, Trent RJ, Winton P, MacLeod AM, Jennings KP. Angiotensin-converting-enzyme inhibitors in the management of cardiac failure: are we ignoring the evidence? *Q J Med* 1995;89:145-150.
 14. Philbin EF, Andreou C, Rocco Jr TA, Lynch LJ, Baker SL. Patterns of angiotensin converting enzyme inhibitor use in congestive heart failure in two community hospitals. *Am J Cardiol* 1996;77:832-838.
 15. The Large State Peer Review Organization Consortium. Heart failure treatment with angiotensin converting enzyme inhibitors in hospitalized Medicare patients in 10 large states. *Arch Int Med* 1997;157:1103-1108.
 16. Simpson Jr RJ, Sueta CA, Boccuzzi SJ, Lulla A, Biggs D, Londhe A, Smith Jr SC. Performance assessment model for guideline-recommended pharmacotherapy in the secondary prevention of coronary artery disease and treatment of LV dysfunction. *Am J Cardiol* 1997;80(8B):53H-56H.
 17. 1997 Physicians Desk Reference. Medical Economics Data Production Company, Montvale, NJ.
 18. Illingworth DR, Tobert JA. A review of clinical trials comparing HMG-CoA reductase inhibitors. *Clinical Therapeutics* 1994;16:366-385.
 19. American Society of Health-System Pharmacists. ASHP Therapeutic guidelines on angiotensin-converting-enzyme inhibitors in patients with LV dysfunction. *Am J Health-Syst Pharm* 1997;54:299-313.
 20. National Cholesterol Education Program. Report of the National Cholesterol Education Program Expert Panel on detection, evaluation, and treatment of high blood cholesterol in adults *Arch Intern Med* 1988;148:36-39.
 21. Northridge DB, Shandall A, Rees A, Buchalter MB. Inadequate management of hyperlipidaemia after coronary bypass surgery shown by medical audit. *Br Heart J* 1994;72:466-467.
 22. Merz CN, Felando MN, Klein J. Cholesterol awareness and treatment in patients with coronary artery disease participating in cardiac rehabilitation. *J Cardiopulmonary Rehabil* 1996;16:117-122.
 23. Scandinavian Simvastatin Survival Study Group. Randomised trial of cholesterol lowering in 4444 patients with coronary heart disease: the Scandinavian Simvastatin Survival Study (4S). *Lancet* 1994; 344:1383-1389.
 24. Sacks FM, Pfeffer MA, Moye LA, Rouleau JL, Rutherford JD, Cole TG, Brown L, Warnica JW, Arnold JM, Wun CC, Davis BR, Braunwald E. The effect of pravastatin in patients with average cholesterol levels. *N Engl J Med* 1996; 335:1001-1009.
 25. Marcelino JJ, Reingold KR. Inadequate treatment with HMG-CoA reductase inhibitors by health care providers. *Am J Med* 1996;100:605-610.
 26. Schrott HG, Bittner V, Vittinghoff E, Herrington DM, Hulley S, for the HERS Research Group. Adherence to national cholesterol education program treatment goals in postmenopausal women with heart disease. *JAMA* 1997;277: 1281-1286.
 27. Havranek EP, Graham GW, Pana Z, Lowes B. Process and outcome of outpatient management of heart failure: a comparison of cardiologists and primary care providers. *Am J Man Care* 1996;2:783-789.
 28. Young JB, Weiner DH, Yusuf S, Pratt CM, Kostis JB, Weiss MB, Schroeder E, Guillote M, for the SOLVD Investigators. Patterns of medication use in patients with heart failure: A report from the registry of studies of LV dysfunction (SOLVD). *Southern Med J* 1995;88:514-523.
 29. Croft JB, Giles WH, Roegner RH, Anda RF, Casper ML, Livengood JR. Pharmacologic management of older adults by office-based physicians in the United States. *J Fam Pract* 1997;44:382-390.