Cost of Medications for Patients With Ischemic Heart Disease in a Rural Family Practice Center

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Background: **Cardiovascular disease is the leading cause of death, and multiple medications are often needed to control symptoms and risk factors. Little research has explored the cost of medications for a typical patient with chronic ischemic heart disease. We undertook a study to determine the cost of medications and how they are paid for by patients in one rural clinic.**

Methods: **One hundred four patients met criteria for chronic ischemic heart disease. We obtained patient information, risk factors, and current medications using retrospective chart reviews. We then calculated usual and customary costs per month for each of the 355 cardiac and 214 noncardiac prescriptions. After we determined which patients qualified for third party reimbursement or the community health center medication discount program, we calculated the actual out-of-pocket cost to the patient for each prescription.**

Results: **Average monthly medication costs were $104.77 for cardiac medications and $115.54 for noncardiac medications, for a total of $220.31. Patients were reimbursed for approximately 64 percent of the total medications costs, making average out-of-pocket medication costs $41.52 for cardiac medications and $36.86 for noncardiac medications, for a total of $78.38. Seventy-one percent of patients were reimbursed by their insurance company, 19 percent qualified for the medication discount program, and 10 percent had no assistance. Patient risk factors included positive family history of chronic ischemic heart disease (71 percent), hypertension (64 percent), history of smoking (61 percent), currently smoking (26 percent), diabetes (25 percent), and recently elevated cholesterol levels (67 percent of 76 patients).**

Conclusions: **Medication costs for patients with chronic ischemic heart disease are expensive and burdensome. Third party payers and the medication discount program relieved a considerable (64 percent) but inadequate amount of prescription costs. Multiple risk factors coexist with these medication costs. Patient behavior modification and an aggressive approach to risk reduction might reduce these costs. (J Am Board Fam Pract 1999;12:200-5.)**

Coronary artery disease continues to be the leading cause of death in the United States. Most ischemic heart disease is associated with identifiable risk factors, and reduction of these risk factors is an optimistic goal of modern medicine. Inevitably, however, medications are necessary to treat both cardiac risk factors and complications of chronic ischemic heart disease. Few studies have addressed the direct costs of medications in treating chronic ischemic heart disease.

The prevalence and costs of chronic conditions have rarely been estimated; in 1990 prescription costs for chronic conditions were $24.3 billion, or 5.7 percent of total direct medical costs.[1] Cost of drugs to treat cardiovascular disease in 1992 was estimated at $6.1 billion.[2] The total cost of cardiovascular disease in Canada was $18.0 billion in 1994, and $1.4 billion was spent on drugs.[3] One market research company predicts that by 1999 the worldwide cardiovascular drug market will exceed $40 billion.[4]

Hypertension is a major risk factor of cardiovascular disease. Costs of antihypertensive drugs can be an obstacle to optimal therapy.[5-8] On the other hand, patients are willing to pay more for safety and effectiveness if they can afford it.[9] Cost of antihypertensive agents can be difficult to estimate.[10] Physicians are faced with the daily dilemma of achieving compliance and efficacy at a reasonable cost. Inability to buy costly medications, a major problem, is more likely to affect the indigent population, who also suffer more cardiovascular disease than the affluent population.[11]

We undertook a study to estimate how much a

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typical patient with chronic ischemic heart disease pays for medications in one locality of rural Appalachia. Cardiovascular risk factors and third party payer data were determined, and usual and customary costs of medications were compared with out-of-pocket costs.

Methods

The study was conducted at Camden-On-Gauley Medical Center, a nonprofit community health center in rural central West Virginia. The clinic has 24,000 patient visits per year and is staffed by 3 family physicians, 1 nurse practitioner, 1 physician's assistant, and 1 pharmacist with an on-site pharmacy. Patients are sometimes referred to cardiologists at two community and two university hospitals. This study was a retrospective chart review and medication cost analysis.

An initial list of 159 patients was generated by selecting those patients with any cardiac code diagnosis from March 1995 to March 1996. Specific codes included those related to ischemic heart disease (ICD 410-414) and other cardiac disease. One hundred four patients met criteria for chronic ischemic heart disease based on positive cardiac stress test results, positive cardiac catheterization findings, myocardial infarction, angina, or related congestive heart failure. Twenty-one charts were excluded because patients were nursing home residents (7) or deceased (9) or because their charts were microfilmed (5). Thirty-four additional charts were reviewed and discarded because of insufficient evidence of chronic ischemic heart disease or coronary atherosclerosis. Demographic information, risk factors, and medications were obtained from the chart review of these 104 patients.

We recorded the medication name, dose, route, and frequency of administration for each patient and categorized the medications as either cardiac or noncardiac. Cardiac medications were all those used to treat cardiac disease and risk factors, which included antihypertensive and antianginal medications, digoxin, diabetes medications, diuretic medications, lipid-lowering agents, and nicotine patches. We recorded only those medications that the patient was taking at the time of chart review.

We then calculated the usual and customary costs per month for each medication using the pharmacy pricing index of the in-house clinic pharmacy. Each patient's prescription was reviewed for eligibility for third party reimbursement (UMWA, Medicaid, Aetna, etc.) or the community health center medication discount program, which waives 10 percent of prescription costs. We then calculated the remaining out-of-pocket cost to the patient for each prescription per month. All costs were calculated as though the patients received their prescriptions from the in-house pharmacy even though some patients get their prescriptions filled elsewhere. We tabulated patient information and risk factors and calculated the mean values. Medication costs were added for each patient. Mean costs were then determined for cardiac and noncardiac medications.

Table 1. Risk Factors of Patients With Documented Congestive Ischemic Heart Disease (n - 104).

Risk Factor	Number	Percent
Male	64	61.5
Positive family history	74	71.0
Hypertension	67	64.0
History of smoking	64	61.5
Current smoking	27	26.0
Last cholesterol level elevated > 200 mg/dL (n - 76)	51	67.0
Diabetes	26	25.0
	Mean Value	
Age, y	64.4	
Weight, lb	180	
Cholesterol, mg/dL (n - 76)	223	
Present pack-year history (n - 27)	47	

Results

The 104 patients were adults aged 30 through 97 years (mean 64.4 years) from Webster and Nicholas counties in West Virginia. Sixty-two percent of the patients were male. Documentation of chronic ischemic heart disease included angina (67), cardiac catheterization (42), myocardial infarction before 1995 (42), myocardial infarction in 1995 (11), congestive heart failure (8), and positive cardiac stress testing (6). Seven patients also had an arrhythmia. Twenty-three patients had undergone coronary artery bypass grafting.

The men ranged in weight from 100 to 400 pounds, with a mean of 185 pounds, and women ranged from 112 to 264 pounds, with a mean of 163 pounds. We did not calculate the body mass index because there was insufficient height information in the patient charts. Other risk factors are

listed in Table 1. Sixty-four patients had a history of smoking; the 27 who were still smoking had a 47-pack-year history. Levels of cholesterol were documented in 76 charts. The average cholesterol level for these 76 patients based on the most recently recorded level was 223 mg/dL. Fifty-one patients had cholesterol levels greater than 200 mg/dL and an average level of 246 mg/dL.

The total of 569 medication prescriptions were reported, 62 percent of which were cardiac medications. The mean number of prescriptions per patient was 3.4 for cardiac and 2.1 for noncardiac medications. Costs are reported in Table 2. Of the patients studied with chronic ischemic heart disease, the average monthly total medication cost was $220.31. Monthly cardiac medications cost $104.77 and noncardiac medications cost $115.54. Seventy-four patients (71.2 percent) had third party reimbursement plans, 20 patients (19.2 percent) qualified for the community health center medication assistance program, and 10 patients (9.6 percent) did not qualify and had no third party coverage. With this finding in mind, the typical patient with chronic ischemic heart disease had an average out-of-pocket expense of $78.38. Monthly cardiac medications cost $41.52 and noncardiac medications cost $38.86 in out-of-pocket expenses for the patient. Monthly cardiac prescriptions are listed in Table 3.

Discussion

Family physicians are particularly interested in costs of medications. Prices of medications influence patient compliance and have an impact on the family budget. This study shows that medication costs can be determined for a chronic illness for patients in a family practice setting. In our clinic patients with chronic ischemic heart disease were taking prescription medications averaging $220 per month, of which $105 were cardiovascular medications and $115 were noncardiac medications.

Table 2. Average Monthly Medication Costs for Patients With Chronic Ischemic Heart Disease.

Medications	Usual and Customary ($)	Out-of-Pocket ($)
Cardiac	104.77	41.52
Noncardiac	115.54	36.86
Total	220.31	78.38

Looking at the total group of 104 patients, third party payers and the medication assistance program reimbursed 64 percent of the total monthly costs. In a highly employed, well-insured population, one would expect medication reimbursement to reach approximately 80 percent. The lower percentage finding in this study might be explained by the 20 patients on the medication discount program who have their prescriptions reduced by only 10 percent and by the 10 uninsured patients who have neither support from third party payers nor discounts. It is possible that other particular aspects of insurance deductibles, reimbursement, and coverage are also involved.

Generally, the 71.2 percent of patients with Medicaid or health insurance have very good medication cost coverage. If Medicaid, UMWA, Aetna, or other insuring agencies were cut back or eliminated, the financial consequences for these patients would be considerable. Two hundred twenty dollars each month can have a serious financial impact on patients who are on a fixed income and who have no medical insurance. The 19.2 percent of patients who qualify for the 10 percent medication discount program still pay 90 percent of the prescription prices, and 9.6 percent of patients pay full prescription prices. Because rural Nicholas and Webster counties are not affluent, those patients without insurance who pay cash for their medications (28.8 percent) are probably having difficulty meeting a monthly budget.

The actual income of the 104 patients was not obtained; however, according to the 1990 census the average per capita income of Nicholas and Webster counties was $7723.[12] Based on this study, the average annual total medication cost of $2643.72 represents 34 percent of the per capita annual income, and the average annual out-of-pocket medication cost of $1438.80 represents 19 percent of the per capita annual income. Considering costs, coverage, and annual income, one cannot help but ponder affordability and compliance.

In a survey of "281 lower income African-Americans in the rural South, 64.2 percent of the households with total Medicaid coverage could always afford prescriptions, but only 40.3 percent of the households without any Medicaid coverage could always afford prescriptions. Many respondents stated that Medicaid eligibility separated those who could afford prescriptions from those who could not."[13] Households that could not af-

Table 3. Cardiac Prescriptions Listed by Descending Order of Cost Within Categories.

More than $100 per month	*From $20 to $49 per Month*	*Less than $20 per Month*
Procainamide ER 1000 mg (120)	Cholestyramine light 210 g	Doxazosin 8 mg (15)
Timolol maleate 20 mg (180)	Nitroglycerin patch 0.2 mg (30)	Furosemide 20 mg (180)
Lovastatin 40 mg (30)	Isosorbide mononitrate 20 mg (60)	Glyburide 5 mg (30)
Isosorbide dinitrate SR 40 mg (90)	Benazepril 10 mg (60)	Triamterene-hydrochlorothiazide 37.5-25 mg (30)
Bepridil 200 mg (30)	Warfarin 2 mg (60)	Magnesium gluconate 500 mg (100)
	Nifedipine ER 30 mg (30)	Propranolol 40 mg (90)
From $50 to $99 per Month	Isosorbide mononitrate 60 mg (30)	Gemfibrozil 600 mg (60)
Amlodipine 5 mg (60)	Diltiazem 24-hr ER 180 mg (30)	Metoprolol 50 mg (30)
Amlodipine 10 mg (30)	Fluvastatin 20 mg (30)	Furosemide 40 mg (30)
Nicotine patch 21 mg (28)	Losartan 50 mg (30)	Furosemide 20 mg (30)
Nifedipine ER 60 mg (30)	Diltiazem 24-hr ER 120 mg (30)	Lanoxicaps 2.0 mg (30)
Lovastatin 20 mg (30)	Nitroglycerin spray 14 g	Potassium chloride 10 mEq (30)
Pravastatin 20 mg (30)	Potassium chloride 20 mEq (60)	Glyburide 2.5 mg (30)
Simvastatin 10 mg (30)	Quinapril 20 mg (30)	Atenolol 25 mg (30)
Insulin human RecombDNA 3 x 10 mL	Enalapril 2.5 mg (30)	Nitroglycerin SL 0.4 mg (25)
Nitroglycerin patch 0.3 mg (30)	Niacin ER 500 mg (30)	Lanoxin 0.25 mg (30)
Glyburide 5 mg (120)	Metoprolol 50 mg (90)	Metoprolol 50 mg (15)
Nitroglycerin patch 0.4 mg (30)	Warfarin 5 mg (30)	Lanoxin 0.125 mg (30)
	Warfarin 2.5 mg (30)	Chlorpropamide 100 mg (15)
	Losartan 25 mg (30)	Clonidine 0.2 mg (30)

*Numbers in parentheses indicate number of tablets dispensed.
ER - extended release, SR - sustained release, SL - sublingual.

ford prescriptions most commonly resorted to financing, postponement, and rationing. Some pharmaceutical companies offer cardiovascular drugs to the indigent at little or no cost.[14] Most of these programs require physicians to telephone the company and fill out an application or write a letter, efforts that are usually unrealistic in a busy office practice. The American Heart Association Task Force recommended 11 measures dealing with the availability of drugs to the indigent. One consideration was to initiate a federal program providing free cardiovascular drugs to poor patients who are not Medicaid recipients.[11]

Risk factors play an important role in the development of chronic ischemic heart disease. The high number of risk factors in this group of patients is consistent with the observed lifestyle in much of rural Appalachia. It is particularly alarming that 26 percent of these patients continue to smoke. Smoking cessation would result in the single greatest immediately achievable risk factor reduction. Although smoking cessation would be cost effective, failure rates are high.

That 49 percent of all patients (51 of 104) had a total cholesterol level of greater than 200 mg/dL suggests poor diet and maybe insufficient use of lipid-lowering agents. The causal role of elevated serum cholesterol in the genesis of atherosclerosis and ischemic heart disease is well established, and reducing cholesterol levels does reduce ischemic cardiac events and mortality.[15] In fact, there are substantial benefits to correcting all the cardiovascular risk factors in the older adult.[16]

Directing energy and money into the reduction of risk factors would benefit the patient and could yield partial savings in the $1257 spent annually on cardiovascular medications. Patients with diabetes represented 25 percent of the study patients. The risk for cardiovascular disease in people with diabetes is two to three times higher than among persons without diabetes; cardiovascular disease accounts for 48 percent of all deaths among persons with diabetes.[17] Achieving long-term glycemic control with weight reduction and diet modification is challenging, but achievements reap benefits in terms of mortality and costs. In one study patients with type 2 diabetes mellitus maintained a weight loss of 19.8 pounds during a 1-year period and reduced monthly antihypertensive and antidiabetes medication costs from $63.30 to $32.40.[18]

In fact, weight loss is the preferred treatment to improve heart disease risk factors in overweight, middle-aged, and older men.[19] Unfortunately, lifestyle measures are characterized by a modest effect on risk factors, low participation rates, and the need for external support for continued success. Current evidence suggests drug treatment is more cost-effective because of a proved effect in decreasing morbidity and mortality.[20]

There are limitations to this study. During the record review we might have overlooked some prescribed medications and, therefore, underestimated the cost of medications. We found an underuse of lipid-lowering agents in that these medications were prescribed for only 75 percent of documented elevated lipid levels. The study sample size and location prevent extrapolation of our finding to other sites, so we cannot assume that patients elsewhere with chronic heart disease were spending a average of $220 a month for medications. Because medication costs at the clinic pharmacy were similar to or slightly less than the two other pharmacies in a 10-mile radius, the medication costs derived here should be considered a conservative amount.

Medication costs pose a difficult problem for physicians and their patients with chronic disease living in rural areas. This study provides an estimate of medication costs for patients with chronic ischemic heart disease in this region. Financial support is needed to help pay for cardiovascular medications. Additional efforts are needed to bring about lifestyle changes that decrease risk factors. Physicians should consider medication costs as they apply to individual patients. Researchers usually compare drug costs in select categories (eg, antihypertension medication costs) or medication expenditures for populations in large health plans. More studies need to focus on medication costs as they apply to the individual patient and the physician's treatment of their illness.

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