

# Effects of Cost Sharing on Care Seeking and Health Status: Results From the Medical Outcomes Study

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Requiring patients to pay a portion of their medical bill out of pocket, also known as cost sharing, sharply reduces their use of health care resources.<sup>1-9</sup> Use of this strategy by health insurance plans to lower expenditures is controversial: proponents argue that health care consumers will appropriately ration their use of medical services; critics fear that this financial disincentive will lead patients to use less care that may be necessary and will result in worse health outcomes.

The RAND Health Insurance Experiment, which randomized subjects to health plans with varying coinsurance levels, did not provide a definitive judgment in regard to these issues. Relative to free care, coinsurance reduced use of both unnecessary and necessary care<sup>1,4</sup> but had only a small adverse effect on health outcomes.<sup>1,10,11</sup> Because the study excluded disabled and elderly individuals, subjects may have been too healthy for a greater negative health effect to be observed. Thus, we analyzed data from the Medical Outcomes Study, which prospectively followed chronically ill adults, to determine whether cost sharing deters use of care and leads to subsequent worse health outcomes among a population whose health may be more vulnerable to use disincentives.

## METHODS

### Study Design

In the Medical Outcomes Study, designed to examine the impact of different systems of care on health outcomes, adults with 1 or more chronic illnesses were followed over 4 years. Site, physician, and subject selection methods have been described elsewhere.<sup>12,13</sup> A multistage sampling technique was used in which physician practices were selected first, followed by physicians and, finally, patients. Patients who visited one of the selected physicians' offices during a 2-week recruitment period between February and October 1986 were asked to participate in a cross-sectional

**Objectives.** This study sought to determine the effect of cost sharing on medical care use for acute symptoms and on health status among chronically ill adults.

**Methods.** Data from the Medical Outcomes Study were used to compare (1) rates of physician care use for minor and serious symptoms and (2) 6- and 12-month follow-up physical and mental health status among individuals at different levels of cost sharing.

**Results.** In comparison with a no-copay group, the low- and high-copay groups were less likely to have sought care for minor symptoms, but only the high-copay group had a lower rate of seeking care for serious symptoms. Follow-up physical and mental health status scores were similar among the 3 copay groups.

**Conclusions.** In a chronically ill population, cost sharing reduced the use of care for both minor and serious symptoms. Although no differences in self-reported health status were observed, health plans featuring cost sharing need careful monitoring for potential adverse health effects because of their propensity to reduce use of care that is considered necessary and appropriate. (*Am J Public Health.* 2001;91:1889-1894)

survey. Eligible subjects (English-speaking individuals 18 years or older) and their physicians were asked to complete a brief screening survey.

Of 28 257 patients who were approached, 20 222 (71.6%) agreed to participate; in the case of 18 974 (67.1%) of these patients, both the patient and his or her physician completed the forms. Through use of the data from the screening survey and an additional telephone interview, 3589 individuals with 1 or more chronic conditions (diabetes, hypertension, coronary heart disease, congestive heart failure, depression) were identified as potential subjects for a 4-year prospective cohort study. Of these patients, 2546 were randomly selected and agreed to participate.

### Study Sample

We analyzed data from the 1700 (67%) subjects who completed the 12- and 18-month surveys, which assessed individuals' level of cost sharing and use of medical care. The remaining 846 subjects were excluded because they did not complete both surveys or were completely lost to follow-up for a variety of reasons, including refusals, failure to contact, and death.

The included and excluded groups were similar in regard to sex, race/ethnicity, education, and annual income but differed in several other respects. In comparison with non-participants, participants were older (57.1 vs 54.2 years;  $P=.0001$ ), more likely to be married (59% vs 52%;  $P=.002$ ), slightly less likely to be employed (48% vs 52%;  $P=.08$ ), and more likely to have a prepaid health plan (43% vs 31%;  $P=.001$ ). The 2 groups had comparable comorbidity scores and Short Form-36 (SF-36)<sup>14</sup> physical health status scores, but the study sample had slightly better SF-36 mental health scores (48.7 vs 46.3;  $P<.001$ ).

### Data Collection

At baseline and every 6 months, subjects were asked to fill out a questionnaire asking about mental and physical health status, use of medical services, annual family income, and insurance. As a means of assessing level of cost sharing for an outpatient visit, subjects were asked "Besides your deductible, how much does your insurance plan pay for a doctor visit for a medical problem?" Response choices were "none," "some," "half," "most," and "all." This response scale was reversed so that the question would reflect how

much the individual paid. For example, subjects whose response was "all" were categorized as having no cost sharing, and subjects whose response was "none" were categorized as being responsible for 100% of the cost of an outpatient visit.

Given the small number of responses for some options, we collapsed individuals into 3 cost-sharing categories: no copay (insurance pays all), low copay (insurance pays more than half but not all), and high copay (insurance pays half or less). Using insurance and employment data, we conducted logistic regression analyses to impute missing data on level of cost sharing for 92 (5.4%) subjects.

We measured use of medical services for minor and serious symptoms by asking subjects whether they had experienced and sought medical care for any of 5 listed minor symptoms or 8 serious/morbid symptoms in the preceding 4 weeks. The minor symptoms were nasal congestion for less than 2 weeks, rash for less than 3 weeks, ankle swelling at the end of the day, stomach upset for less than 24 hours, and cough without fever for less than a week. The serious and morbid symptoms were loss of consciousness, bleeding other than from the nose or caused by accidents or menstruation, abdominal pain that caused awakening for more than 1 night, burning on urination for more than 2 days, weakness on one side of the body or loss of speech, shortness of breath in the middle of the night, chest pain brought on by activity, and more than 4 bowel movements per day for more than 2 weeks.

Of the 13 symptoms just described, 8 were examined in a recent study involving a national sample of physicians who rated the seriousness of the symptoms.<sup>15</sup> On a 10-point scale in which higher values represented greater seriousness, average ratings were 2.8 for minor symptoms and 7.0 for serious and morbid symptoms.

To measure health status, we used the SF-36 physical and mental health summary scales.<sup>14</sup> Summary scores can range from 0 to 100 and are scaled so that the mean of a representative US general population is 50 with a standard deviation of 10. Summary scores for some individuals were missing because of 1 or more missing subscale scores. We conducted a least squares regression analysis in-

volving nonmissing subscale scores to impute missing summary health status scores.

To calculate comorbidity scores, we used an unweighted count of 16 different chronic conditions, including the 5 chronic conditions required for eligibility in the cohort study. The other 11 chronic conditions were cancer, arthritis, major neurologic deficit, use of a cardiac pacemaker, amputated limb, chronic pulmonary disease, chronic back pain, peptic ulcer disease, chronic inflammatory bowel syndrome, kidney disease, and difficulty seeing. Satisfaction with general health care was assessed via a validated measure created for the Medical Outcomes Study.<sup>16,17</sup>

In the remainder of this article, we refer to the 12-month questionnaire, the point at which cost-sharing status was first assessed, as time 0 and to the subsequent 18-month and 24-month questionnaires as time 1 and time 2, respectively. Use of medical care for minor and serious symptoms was assessed at time 1, and health status was measured at all 3 points.

### Statistical Analysis

We performed bivariate comparisons of the 3 cost-sharing groups in regard to demographic characteristics, type of health insurance coverage, comorbidity score, baseline mental and physical health status, and satisfaction with medical care. Chi-square statistics were used to compare differences in proportions among categorical variables, and factorial analysis of variance (ANOVA) statistics were used to examine differences in means.

We used Mantel-Haenszel  $\chi^2$  statistics to test for trends in the proportions of each group of subjects who sought care for minor and serious symptoms among those who reported having symptoms.<sup>18</sup> Individuals were categorized as having sought care if they reported seeking medical care for at least 1 of the symptoms. For example, subjects who had experienced 2 symptoms but had sought care for only 1 of them were categorized as having sought care for their symptoms. In addition, we conducted separate analyses for minor and serious symptoms.

We performed a multiple logistic regression analysis to adjust for subjects' demographic characteristics, insurance type, physical and mental health status, and satisfaction

with care. Because individuals who experienced more symptoms would be more likely to have sought medical care, we also controlled for the number of symptoms experienced. We added an interaction term between income and level of cost sharing to the multivariable models because we hypothesized that cost sharing might have a greater effect among those with lower incomes; however, this interaction term was not a significant predictor, and we excluded it from the final models.

We conducted 2 sensitivity analyses. First, we repeated our analysis but excluded subjects with Medicaid or no insurance, because their greater likelihood of having additional unmeasured barriers to care could have confounded our findings. Our results were robust and were not substantially changed when these individuals were excluded. Second, we excluded individuals with selected chronic conditions who might have had different medical care needs for certain symptoms. For example, the necessity of medical care for chest pain is likely to be different for individuals with and without coronary artery disease. Similarly, the presence of chronic pulmonary disease might influence the need to seek care for dyspnea. Our results were unchanged after we excluded individuals with a history of cardiac and pulmonary disease.

Finally, using factorial ANOVA statistics, we compared physical and mental health status scores at time 1 and time 2 among the 3 cost sharing groups. We then used analysis of covariance (ANCOVA)<sup>19</sup> to compare the 3 copay groups in regard to health status scores at time 1 and time 2, adjusting for health status at time 0 and other potential confounders. An interaction term between income and cost sharing was found not to be a statistically significant predictor of health status and thus was not included in the final ANCOVA models.

We weighted all analyses to account for the original sampling strategy.<sup>20</sup> Sensitivity analyses excluding observations with imputed values revealed no differences in any of our results. No statistical outliers or influential points were found in any of the multivariable models.<sup>21,22</sup> SAS software was used for all analyses.<sup>23</sup>

**TABLE 1—Comparison of Baseline Characteristics, by Level of Cost Sharing: Medical Outcomes Study**

	Cost-Sharing Level			P
	None (n=824)	Low (n=611)	High (n=265)	
Mean age, y (95% CI)	58.7 (57.6, 59.8)	54.8 (53.6, 56.1)	57.4 (55.4, 59.5)	.001
Females, %	60	63	60	...
Minority, %	25	12	24	.001
Married or has a partner, %	63	66	54	.001
Graduated high school, %	78	86	75	.001
Employed, %	38	48	39	.001
Mean annual family income <sup>a</sup> (95% CI)	20.3 (19.3, 21.3)	23.5 (22.3, 24.7)	20.0 (17.9, 22.2)	.001
Insurance status, %				.001
Uninsured	0.5	5	2	...
Medicaid	16	6	9	...
Prepaid health plan	68	21	16	...
Fee for service	16	68	74	...
Mean comorbidity score (95% CI)	2.0 (1.9, 2.1)	1.9 (1.8, 2.0)	1.9 (1.8, 2.1)	>.2
Mean physical health status score (95% CI)	42.6 (41.8, 43.4)	43.6 (42.7, 44.6)	43.1 (41.6, 44.6)	>.2
Mean mental health status score (95% CI)	50.4 (49.6, 51.1)	49.0 (48.1, 49.9)	48.9 (47.6, 50.3)	.05
Mean general satisfaction score (95% CI)	6.5 (6.4, 6.7)	6.5 (6.4, 6.7)	6.5 (6.3, 6.7)	>.2

Note. CI = confidence interval.

<sup>a</sup>\$1000s in 1986 dollars.

## RESULTS

Of the 1700 subjects, 48% reported having no cost sharing (no-copay group) for an outpatient visit, as compared with 16% who reported that they paid half or more of their outpatient medical bill (high-copay group) and 36% who reported that they paid some but less than half of their medical bill (low-copay group). The low-copay group members were the youngest ( $P < .001$ ) and had the highest incomes ( $P < .001$ ), and this group included the smallest proportion of minorities ( $P < .001$ ; see Table 1). The low-copay group also included the largest proportions of individuals who were married or living with a partner ( $P < .001$ ), had graduated from high school ( $P < .001$ ), and were employed ( $P < .001$ ).

The 3 copay groups were also different in terms of their insurance coverage ( $P < .001$ ). Of the no-copay group members, 68% had a prepaid health plan, in comparison with 21% of the low-copay group members and 16% of the high-copay group members. In contrast, the low- and high-copay groups were most likely to have fee-for-service health insurance (68% and 74%, respectively). Only a small

proportion of the total sample was uninsured (2%) or had Medicaid coverage (11%).

### Effect of Cost Sharing on Seeking Care

Among those who reported symptoms, the unadjusted percentages of subjects who sought medical care for minor and serious symptoms were 29% and 30%, respectively. For both types of symptoms, decreasing gradients for seeking care were found with higher levels of cost sharing. The unadjusted rates of care seeking for minor symptoms were 34% for the no-copay group, 26% for the low-copay group, and 18% for the high-copay group ( $P = .001$ ). Unadjusted care seeking rates for serious symptoms were 33%, 31%, and 18% for the no-, low-, and high-copay groups, respectively ( $P = .05$ ). This monotonic relationship between cost sharing and seeking care for symptoms remained unchanged after adjustment for other demographic and health variables.

In the weighted multivariable regression analyses, both the low- and high-copay groups were less likely to seek care for minor symptoms than the no-copay group (low-copay group: odds ratio [OR] = 0.80,  $P = .03$ ;

high-copay group: OR = 0.39,  $P = .0001$ ) (Table 2). Regarding serious symptoms, the high-copay group was less likely to seek care than the no-copay group (OR = 0.22,  $P = .0001$ ), but the low- and no-copay groups did not differ (OR = 0.80,  $P = .15$ ). The multivariable analysis also showed that being married, employed, and uninsured; having a higher income; and being in better physical health were associated with a lower likelihood of seeking care for minor symptoms. Those who were older, male, White, and unemployed; had fee-for-service health insurance coverage; and had higher comorbidity scores were more likely to have sought care for serious symptoms.

### Effect of Cost Sharing on Health Status

To examine the impact of cost sharing on health status, we examined the SF-36 physical and mental health summary scores of individuals at time 1 and time 2, controlling for health status at time 0. The 3 cost-sharing groups had similar unadjusted physical and mental health status scores at time 1 and time 2. After adjustment for baseline health status, comorbidity score, demographic

**TABLE 2—Adjusted Odds Ratios for Predictors of Seeking Care for Minor and Serious Symptoms: Medical Outcomes Study**

Predictor Variable	Sought Care for Minor Symptoms (n = 1052)		Sought Care for Serious Symptoms (n = 529)	
	OR (95% CI)	P	OR (95% CI)	P
Level of cost sharing				
None	1.0 ...	...	1.0 ...	...
Low	0.80 (0.65, 0.97)	.03	0.80 (0.58, 1.08)	.15
High	0.39 (0.29, 0.52)	<.001	0.22 (0.13, 0.36)	<.001
Age <sup>a</sup>	1.02 (0.96, 1.08)	>.2	1.11 (1.01, 1.22)	.03
Male	1.18 (0.99, 1.40)	0.07	1.40 (1.07, 1.83)	.02
Minority	1.11 (0.90, 1.37)	>.2	0.59 (0.43, 0.83)	.002
Married or has a partner	0.72 (0.60, 0.86)	<.001	0.91 (0.70, 1.19)	>.2
Graduated high school	1.18 (0.96, 1.46)	.12	0.97 (0.71, 1.33)	>.2
Employed	0.77 (0.63, 0.95)	.01	0.49 (0.36, 0.67)	<.001
Income <sup>b</sup>	0.91 (0.86, 0.96)	.002	0.96 (0.86, 1.06)	>.2
Insurance type				
Fee for service	1.0 ...	...	1.0 ...	...
No insurance	0.20 (0.07, 0.56)	.002	0.50 (0.23, 1.09)	.08
Medicaid	0.90 (0.74, 1.31)	>.2	0.68 (0.46, 1.00)	.05
Prepaid health plan	0.98 (0.81, 1.20)	>.2	0.65 (0.48, 0.88)	.005
Satisfaction with care <sup>c</sup>	1.02 (0.97, 1.06)	>.2	1.06 (0.98, 1.13)	.13
Comorbidity score	1.08 (1.00, 1.16)	.06	1.15 (1.04, 1.27)	.006
Physical health <sup>c</sup>	0.95 (0.91, 1.00)	.04	0.97 (0.90, 1.04)	>.2
Mental health <sup>c</sup>	1.01 (0.96, 1.06)	>.2	0.99 (0.92, 1.06)	>.2

Note. Odds ratios (ORs) are also adjusted for the number of symptoms experienced by the individual. CI = confidence interval.

<sup>a</sup>In 10-year increments.

<sup>b</sup>Annual family income in \$10 000 increments.

<sup>c</sup>Based on a 10-point scale.

characteristics, insurance type, and satisfaction with care, follow-up physical and mental health status remained similar among the 3 groups (Table 3). Of note, lower income was a predictor of worse follow-up physical and mental health status at time 1 in our multivariable models, but no interaction effect between income and cost sharing was found.

## DISCUSSION

Unlike cost-controlling strategies, such as drug formulary restrictions and use reviews, that target the behavior of physicians or medical groups, cost sharing is directly aimed at consumers. It encourages individuals to ration their health care, leading some to worry that cost sharing might threaten people's health. This concern is based on the assumptions that (1) individuals may not always distinguish between necessary and unnecessary

care and (2) forgoing necessary medical care will worsen health.

Although previous studies have examined populations that included some chronically ill individuals (e.g., the Medicaid and Medicare populations),<sup>24–26</sup> the present study is the first to examine the impact of cost sharing in a cohort of older adults specifically selected because they had 1 or more chronic illnesses. In this study, both low and high levels of cost sharing, in comparison with no cost sharing, were associated with less use of medical care for minor symptoms. Cost sharing was also associated with lower rates of seeking care for serious symptoms, but only at the highest cost-sharing level.

These findings suggest that the demand for care for serious symptoms is less sensitive to price than that for minor symptoms and indicate that older, chronically ill individuals distinguish between more and less necessary

care. This is significant because existing literature on the subject has been mixed. The RAND Health Insurance Experiment<sup>4</sup> and the Access-to-Care Study<sup>7</sup> showed that cost sharing reduces the use of care for minor symptoms; however, these 2 studies revealed different effects on use of care for serious symptoms. In the RAND Health Insurance Experiment, cost sharing had a marginal effect among individuals seeking care for serious symptoms, but in the Access-to-Care Study those with out-of-pocket payments greater than \$30 exhibited significantly less use of care for serious symptoms.

Although individuals in the Medical Outcomes Study demonstrated some ability to distinguish between more and less necessary care, many were subjected to sufficiently high costs that their use of more necessary care was diminished. Our results are more consistent with those of the Access-to-Care Study and provide additional evidence that high levels of cost sharing deter the use of medical care that may be considered more appropriate and necessary.

Previous studies have demonstrated little or no impact of cost sharing on health outcomes, but these studies have not primarily involved individuals who are chronically ill and, thus, particularly vulnerable. In contrast, the Medical Outcomes Study was designed to examine an older, chronically ill population and involved subjects who had diabetes, hypertension, coronary artery disease, congestive heart failure, or depression. In addition, 46% of these subjects were older than 62 years (the upper age cutoff for inclusion in the RAND Health Insurance Experiment). We hypothesized that cost sharing would have a significant negative impact on health status in this sample owing to the subjects' advanced age and greater disease burden.

We found no association between cost sharing and health status at baseline or follow-up. Other studies of cost sharing examining acutely ill individuals have also failed to observe any negative health effect from cost sharing.<sup>9,27</sup> This lack of finding is particularly surprising given that the RAND Health Insurance Experiment involved a comparatively younger and healthier population and revealed a small yet statistically significant effect on health. One explanation may be re-

**TABLE 3—Unadjusted and Adjusted Physical and Mental Health Status Scores, by Level of Cost Sharing: Medical Outcomes Study**

	Level of Cost Sharing		
	None Mean (95% CI)	Some Mean (95% CI)	Half or More Mean (95% CI)
Adjusted physical health status <sup>a</sup>			
Time 1	41.6 (41.1, 42.1)	41.0 (40.3, 41.6)	41.1 (40.2, 42.1)
Time 2	42.6 (42.0, 43.2)	42.7 (42.0, 43.5)	42.5 (41.4, 43.5)
Adjusted mental health status <sup>b</sup>			
Time 1	48.9 (48.4, 49.5)	50.1 (49.4, 50.9)	49.8 (48.7, 50.9)
Time 2	50.9 (50.3, 51.5)	51.2 (50.4, 52.0)	52.0 (50.7, 52.8)

Note. Health status measured at time 1 and time 2 refers to SF-36 summary health status measured on the 18- and 24-month follow-up questionnaires, respectively. CI = confidence interval.

<sup>a</sup>Adjusted for physical health status at the 12-month follow-up (time 0), demographic characteristics, insurance type, comorbidity score, mental health status, and satisfaction with care.

<sup>b</sup>Adjusted for mental health status at the 12-month follow-up (time 0), demographic characteristics, insurance type, comorbidity score, mental health status, and satisfaction with care.

lated to the influence of income on the effect of cost sharing. Health Insurance Experiment subjects who were in the lowest income category suffered the worst health outcomes due to cost sharing. Others have also shown that the health of the poor is particularly sensitive to limitations in access to care.<sup>11,28,29</sup> Therefore, we may have failed to observe an association between cost sharing and worse health because subjects in the Medical Outcomes Study had relatively high incomes.

The sampling methods also might have weakened the relationship of cost sharing with health status. Because subjects were selected through physicians' offices, the study sample represents those who use care and probably overrepresents frequent users. Other studies have suggested that mortality rates are higher among those who forgo care because of poor access.<sup>28,30</sup> If so, those most affected by cost sharing might have been underrepresented in our sample.

The time frame of our analysis may not have been optimal to detect a negative impact on health outcomes. The RAND Health Insurance Experiment demonstrated that cost sharing had its greatest impact through lowering use of general health examinations and preventive care.<sup>1</sup> The effect on an individual's health of receiving less preventive care would probably be delayed. Thus, the 1-year follow-up in our analysis may have been too brief. In addition, we observed subjects after they

had already been exposed to cost sharing for some time, and thus cost sharing may have already affected their health by the time of our study. Consequently, the study may have been biased owing to a survival effect.

A limitation of our study is that only 67% of the original cohort had sufficient follow-up data for inclusion in the analyses. Our sample was demographically different from the excluded sample and raises the possibility of sampling bias. Included subjects were more likely to have prepaid health plans, to be in better health, and to have answered the follow-up surveys. Thus, the excluded group may have been more vulnerable to cost sharing, which might partly explain why cost sharing appeared to have no effect on health status.

The present study was based on observational data; therefore, we cannot be completely assured of the comparability of the different cost-sharing groups, even after controlling for potential confounders. For example, a selection bias may exist given that those who are more likely to use medical care tend to choose more generous health plans.<sup>31</sup> The resulting endogenous relationship between cost sharing and use of medical care would tend to exaggerate an apparent effect of cost sharing on use of care without taking into account the effect of use of care on choice of health benefits. In addition, health insurance coverage differed among the 3 cost-sharing groups, raising the possibility that some unob-

served differences in health plans confounded our results.

Another limitation was the use of self-reports to assess level of cost sharing, in that patients may be inaccurate in reporting details of their health benefits.<sup>32</sup> However, one might argue that perceived generosity of the health plan may be an equally or more important factor influencing use. Our cost-sharing measure also limited our ability to distinguish copayments from coinsurance. Copayments are generally considered to result in lower out-of-pocket expenditures, because the fee is fixed and not affected by the complexity of the service. This distinction may be important in measurements of the impact of cost sharing. Because of the sampling methods, our study underrepresented those who are younger, uninsured, and poor. Although our results lack generalizability to all patients in care, the present study complements previous work on this topic.<sup>4,7</sup>

The findings from our study may also not be generalizable to today's health care market, given the substantial changes that have taken place in the structure of managed care plans since the study was conducted, more than 10 years ago. Finally, incomplete follow-up data on deaths could have led to an underestimation of the effect of cost sharing on health. Seventy-seven individuals were lost to follow-up, possibly owing to death. However, these individuals were equally distributed among the 3 cost-sharing groups, which suggests that lack of follow-up death data did not bias our results.

Cost sharing clearly deters use of medical care, even among the chronically ill. Although patients seem able to distinguish between the necessity of care for less and more serious symptoms, we have shown that higher levels of cost sharing lead patients to seek care less often for serious symptoms, a finding that was not clearly demonstrated in the RAND Health Insurance Experiment. The results of this study also extend our understanding of cost sharing to an older, chronically ill population, a group previously receiving limited scrutiny.

Although we found no effect of cost sharing on health status, it is important to question its use, given that sufficiently high cost sharing appears to dissuade patients from

seeking care for serious symptoms, problems for which most physicians would agree that seeking care is appropriate. Because patients continue to cite costs as a significant barrier to care and out-of-pocket costs have recently been rising,<sup>33-35</sup> we need to remain vigilant of the extent to which cost sharing impedes patients' access to care and influences health outcomes. ■

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### Contributors

M.D. Wong planned and conducted all of the analyses and wrote the paper. R. Andersen, C.D. Sherbourne, R.D. Hays, and M.F. Shapiro provided guidance in designing the analysis and participated in the writing of the manuscript. M.F. Shapiro participated in the original design of some of the Medical Outcomes Study survey questions used for this analysis.

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