Special Article

ABSENCE OF ASSOCIATION BETWEEN INSURANCE COPAYMENTS AND DELAYS IN SEEKING EMERGENCY CARE AMONG PATIENTS WITH MYOCARDIAL INFARCTION

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ABSTRACT

Background The requirement of copayments for emergency care is thought to control costs by reducing "inappropriate" visits to the emergency department. However, requiring copayments may lead to adverse outcomes if patients delay seeking care for emergency conditions. To determine whether such requirements are associated with delays in seeking care, we examined the length of time from the onset of symptoms to arrival at the hospital among patients with myocardial infarction who did or did not have required insurance copayments.

Methods All patients were enrolled in a single health maintenance organization (HMO) and presented with myocardial infarction at 1 of 19 hospitals in King County, Washington, from 1989 through 1994. There were 602 patients whose health insurance required a copayment for emergency department care (range, $25 to $100) and 729 patients with no copayment requirement. Data on the time to presentation were obtained from a review of ambulance and hospital records.

Results The median length of time from the onset of symptoms to arrival at the hospital, as adjusted for age, sex, and race, was 135 minutes for the copayment group and 137 minutes for the group with no copayment (95 percent confidence interval for the difference, −19 to +16 minutes). There was no significant association between the presence or absence of a copayment requirement and the time to arrival at the hospital after adjustment for calendar year, income, educational level, cardiac history, or clinical symptoms. Since some patients may be unaware of their copayment requirement, we performed a subgroup analysis of data on patients who had a previous visit to the emergency department with the same copayment status — that is, of patients who were likely to know about their copayment. This analysis also showed no significant association between the requirement for a copayment and delays in seeking treatment.

Conclusions For privately insured patients in this HMO, the requirement of modest, fixed copayments for emergency services did not lead to delays in seeking treatment for myocardial infarction. (N Engl J Med 1997;336:1722-9.)

REQUIRING patients to share the cost of emergency services reduces the total number of visits to emergency departments. O'Grady et al. found that patients in a fee-for-service medical care system who had a coinsurance requirement for emergency visits used emergency services 20 to 40 percent less often than those with no such requirement.[1] Similarly, Selby and colleagues reported that the introduction of a requirement specifying copayments for emergency department care resulted in a 15 percent decline in visits to the emergency department by enrollees of a health maintenance organization (HMO).[2]

Although these studies provide valuable insights into the effects of cost sharing on the use of services, they do not address whether insurers' requirement of copayments leads patients to delay seeking care for emergency conditions such as acute myocardial infarction. Prompt medical attention during the early hours of myocardial infarction improves patients' outcome by preventing life-threatening arrhythmias and reducing both infarct size and mortality.[3-11]

To determine whether an emergency department copayment is associated with greater delays in seeking care, we examined the time from the onset of symptoms to arrival at the hospital among patients with myocardial infarction according to whether their

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health insurance required a copayment. We hypothesized that patients who had to make copayments would take longer to seek medical care than those with no copayment requirement.

METHODS

Setting and Copayment Policy

The study was conducted at Group Health Cooperative of Puget Sound, a prepaid health plan in western Washington State with more than 500,000 enrollees who receive medical care from salaried providers. Most subscribers are insured under contracts with employers or government agencies that specify the amount of their copayment. For over 90 percent of enrollees, the emergency department copayment is not a matter of subscribers' choice.

The copayment required for care in the emergency department is displayed on the front of the identification card that patients use when they present for care. Enrollees generally receive care from Group Health providers, but for emergencies they are encouraged to go to the nearest medical facility. Patients who go to a Group Health emergency department are requested to make copayments when they register; those who are unable to pay at that time and those who go to a non–Group Health facility are billed for the copayment.

Subjects

The subjects were Group Health enrollees who were admitted with acute myocardial infarction to any of 19 hospitals participating in the Myocardial Infarction Triage and Intervention (MITI) Project from 1989 through 1994. The patients were identified retrospectively by linking the Group Health enrollment file with the MITI registry, a data base including all patients admitted with suspected myocardial infarction to hospitals in the Seattle metropolitan area.

Patients admitted after resuscitation from cardiac arrest, as well as those given a diagnosis of myocardial infarction after admission for another condition (e.g., orthopedic surgery), were excluded. For the small proportion of patients with more than one admission for myocardial infarction during the study period, only the first admission was included. The study was approved by the University of Washington Human Subjects Review Committee.

Sources of Data

Characteristics of the MITI registry, data-gathering procedures, and measures of reliability have been described previously.[12] Trained abstracters collected detailed data from patients' records. Demographic variables that we analyzed included age, sex, and race. Clinical symptoms included the presence of chest pain, epigastric pain, dyspnea, diaphoresis, nausea, syncope, or shock at or before hospital arrival. Variables related to cardiac history included previous myocardial infarction, heart failure, angina, percutaneous coronary angioplasty, and bypass surgery. Base-line data for some of the cardiac-history and clinical-symptom variables were available only for a subgroup of the patients, because the data-abstraction form was modified twice during the six-year study period for reasons unrelated to the present analysis.

We measured the length of time in minutes between the onset of symptoms that prompted the patient to seek treatment and his or her arrival at the hospital. The time of onset of symptoms was reported by the patient and recorded by hospital staff and paramedics. The Group Health enrollment file was used to determine a patient's copayment status during the month in which the myocardial infarction occurred.

We obtained proxy measures of socioeconomic status by linking each person's residential address to his or her census-block group, an official subdivision containing about 1000 inhabitants.[13] For the 89 percent of patients for whom an address was available, the median family income and distribution of educational levels (percentages with less than a high-school education, high school only, and college education) for their census-block group were recorded.

Statistical Analysis

We used chi-square, Fisher's exact, and Student's t-tests to assess differences between the copayment and no-copayment groups in base-line characteristics. Since the copayment status was strongly associated with age, the base-line comparisons were stratified according to whether the patient's age was less than 65 years or 65 years or older, the age at which eligibility for Medicare begins.

We constructed a series of Cox proportional-hazards regression models to identify variables associated with the length of time to arrival at the hospital and to assess the effect of copayment requirements. The dependent variable was the length of time from the onset of symptoms to arrival at the hospital. Demographic and socioeconomic characteristics, clinical symptoms, and details of the cardiac history were entered as independent variables. Tests for first-order interactions were carried out to determine whether the effect of the copayment requirement varied according to the enrollee's age, sex, race, or cardiac history, the amount of the copayment, or the educational level and median income in the neighborhood in which the patient resided. We applied the hazard ratio and the 95 percent confidence interval for the hazard ratio to the estimated base-line survival function to calculate an approximate 95 percent confidence interval for the difference in the median time it took patients to seek treatment between the copayment group and the group with no copayment.[14]

To determine whether the association between copayment status and time to arrival at the hospital was affected by patients' lack of awareness of their copayment status, we analyzed the length of time to arrival at the hospital in a group of 305 patients who had made a previous visit to the emergency department and who had the same copayment status at the previous visit (both in terms of the copayment requirement and the amount of the copayment).

To test for possible selection bias due to our studying only patients who eventually reached the hospital, we examined the relation between the copayment for emergency care and the incidence of out-of-hospital cardiac arrest in a case–control study. We identified cases of out-of-hospital cardiac arrest among Group Health enrollees from 1991 through 1993. The Seattle and suburban King County emergency-medical-services (EMS) files and the Washington State death-registry files were compared with the Group Health enrollment file to identify potential cases.[15] Control subjects were selected at random from the Group Health enrollment file and were frequency-matched to the cases according to 10-year age group, sex, use of cardiac medications (digoxin or nitroglycerin), and calendar year of treatment. We used the chi-square test and logistic-regression models to compare the proportions of patients with copayment requirements in the case and control groups.

Finally, to assess whether potential differences in the time it took patients to seek treatment would result in adverse outcomes, we compared the unadjusted in-hospital case fatality rates in the copayment group and the group with no copayment requirement, using the chi-square test. Logistic-regression models with in-hospital death as the dependent variable were constructed to control for potential confounding by the length of the hospital stay and by demographic, socioeconomic, and cardiac-history variables. Survival in the study groups was also assessed in relation to copayment status by means of Cox proportional-hazards analysis. We computed the relative risk of death according to copayment status, with adjustment for demographic, socioeconomic, and cardiac-history variables. Follow-up data were available with respect to survival through the end of 1993.

TABLE 1. SOCIODEMOGRAPHIC FACTORS, CARDIAC HISTORY, CLINICAL SYMPTOMS, AND USE OF TRANSPORT BY EMERGENCY-MEDICAL-SERVICES (EMS) PERSONNEL AMONG PATIENTS WITH AND WITHOUT COPAYMENT REQUIREMENTS, ACCORDING TO AGE.

VARIABLE	NO COPAYMENT		COPAYMENT		P VALUE
	NO. OF PATIENTS	VALUE	NO. OF PATIENTS	VALUE	
Patients less than 65 years of age					
Mean age (yr)	101	54.7	390	53.9	0.36
Block-group median family income ($)	90	42,192	339	39,982	0.17
Block-group % with less than high-school education	90	12.6	339	12.7	0.97
	NO. WITH CHARACTERISTIC/ TOTAL NO.	%	NO. WITH CHARACTERISTIC/ TOTAL NO.	%	
Sociodemographic characteristics					
Male sex	86/101	85.1	298/390	76.4	0.06
White race	80/92	87.0	340/380	89.5	0.49
Cardiac history					
Angina	19/101	18.8	97/390	24.9	0.20
Myocardial infarction	19/101	18.8	50/390	12.8	0.12
Heart failure	5/101	5.0	10/390	2.6	0.21
Bypass surgery	9/101	8.9	27/390	6.9	0.49
Thrombolytic therapy	0/88	0	7/303	2.3	0.36
Coronary angioplasty	2/88	2.3	12/303	4.0	0.74
Diabetes mellitus	17/69	24.6	53/316	16.8	0.12
Clinical symptoms					
Chest pain	82/88	93.2	294/303	97.0	0.12
Syncope	1/88	1.1	3/303	1.0	1.0
Shock	1/88	1.1	2/303	0.7	0.54
Epigastric pain	7/67	10.4	25/262	9.5	0.82
Nausea	23/67	34.3	93/262	35.5	0.86
Dyspnea	24/67	35.8	100/262	38.2	0.72
Diaphoresis	37/67	55.2	143/262	54.6	0.93
Calendar year					<0.01
1989	26/101	25.7	54/390	13.8	
1990	27/101	26.7	61/390	15.6	
1991	24/101	23.8	78/390	20.0	
1992	10/101	9.9	92/390	23.6	
1993	9/101	8.9	75/390	19.2	
1994	5/101	5.0	30/390	7.7	
Transport to hospital by EMS personnel	55/101	54.5	188/390	48.2	0.26

RESULTS

Base-Line Characteristics

We identified 1523 Group Health enrollees with myocardial infarction during the study period. Copayment status was known for 1450 of the patients (95.2 percent). The time from the onset of symptoms to arrival at the hospital was available for 1331 (91.8 percent) of these 1450 patients (90.7 percent of those with copayments and 92.7 percent of those without copayments). Of the 1331 patients, who made up the study population, there were 602 patients in the copayment group and 729 patients in the no-copayment group. Of those with a required copayment, 308 (51.2 percent) paid $25 per visit to the emergency department, 289 (48.0 percent) paid $50, and 5 (0.8 percent) paid $100.

Copayment status was strongly associated with age and calendar year. Most patients less than 65 years of age (79.4 percent) had a copayment requirement, whereas far fewer older patients (25.2 percent) had to make a copayment. More patients had copayment requirements in the later years of the study, reflecting changes in enrollee benefit packages over time (Table 1).

Patients under 65 Years of Age

Among patients under 65 years of age, demographic and socioeconomic factors, cardiac history, clinical symptoms, and the frequency of transport to the hospital by EMS personnel were similar in the copayment and no-copayment groups. However, there was a trend toward a higher percentage of males and of patients with a history of diabetes mellitus or myocardial infarction in the group without copayments.

Patients 65 Years of Age or Older

Within the group of patients 65 or older, there were no significant differences in age, sex, cardiac history, use of transport by EMS personnel, or clin-

TABLE 1. CONTINUED.

VARIABLE	NO COPAYMENT		COPAYMENT		P VALUE
	NO. OF PATIENTS	VALUE	NO. OF PATIENTS	VALUE	
Patients 65 years of age or older					
Mean age (yr)	628	75.6	212	76.0	0.53
Block-group median family income ($)	561	37,415	189	40,699	<0.01
Block-group % with less than high-school education	561	13.2	189	11.8	0.02
	NO. WITH CHARACTERISTIC/ TOTAL NO.	%	NO. WITH CHARACTERISTIC/ TOTAL NO.	%	
Sociodemographic characteristics					
Male sex	360/628	57.3	134/212	63.2	0.13
White race	574/603	95.2	190/208	91.3	0.04
Cardiac history					
Angina	224/628	35.7	83/212	39.2	0.36
Myocardial infarction	130/628	20.7	41/212	19.3	0.67
Heart failure	84/628	13.4	26/212	12.3	0.68
Bypass surgery	49/628	7.8	24/212	11.3	0.12
Thrombolytic therapy	2/591	0.3	1/74	1.4	0.30
Coronary angioplasty	11/591	1.9	4/74	5.4	0.07
Diabetes mellitus	97/455	21.3	38/204	18.6	0.43
Clinical symptoms					
Chest pain	551/591	93.2	67/74	90.5	0.39
Syncope	15/591	2.5	1/74	1.4	1.0
Shock	8/591	1.4	0/74	0	0.61
Epigastric pain	38/485	7.8	8/59	13.6	0.14
Nausea	179/485	36.9	16/59	27.1	0.14
Dyspnea	216/485	44.5	29/59	49.2	0.50
Diaphoresis	220/485	45.4	26/59	44.1	0.85
Calendar year					<0.01
1989	125/628	19.9	3/212	1.4	
1990	155/628	24.7	20/212	9.4	
1991	151/628	24.0	19/212	9.0	
1992	152/628	24.2	10/212	4.7	
1993	29/628	4.6	118/212	55.7	
1994	16/628	2.5	42/212	19.8	
Transport to hospital by EMS personnel	366/628	58.3	137/212	64.6	0.12

ical symptoms between the copayment and the no-copayment groups (Table 1). However, fewer whites than nonwhites had a copayment requirement, and those with copayment requirements lived in neighborhoods with higher median incomes and educational levels than those without required copayments.

Predictors of the Time to Arrival at the Hospital

The overall median time from the onset of symptoms to arrival at the hospital was 136 minutes. As shown in Table 2, older patients took longer to seek care than patients less than 65 years of age. Women came to the hospital later than men. No significant differences in the time to arrival were found according to race, income, educational level, or calendar year.

Patients who had previously undergone angioplasty and patients who had chest pain, nausea, or diaphoresis came to the hospital sooner. The time to arrival at the hospital was longer among patients with diabetes and those who had epigastric pain. Although the differences were not statistically significant, patients who had syncope or shock arrived at the hospital sooner than those without these findings.

Effects of Copayment Requirements on the Time to Arrival at the Hospital

Figure 1 shows that the cumulative percentage of patients presenting to the emergency department at any given time after the onset of symptoms was similar for those with and those without required copayments. The median time to arrival at the hospital for patients less than 65 years old was 107 minutes in the no-copayment group and 116 minutes in the copayment group ($P = 0.19$). For patients who were 65 years old or older, the median time was 153 minutes for the no-copayment group and 149 minutes for the copayment group ($P = 0.65$). We found little association between the length of time to arrival and the amount of the copayment. The age-adjusted median time to arrival at the hospital was 136 minutes for those with no copayment, 135 minutes for those

TABLE 2. MEDIAN TIME FROM THE ONSET OF SYMPTOMS TO ARRIVAL AT THE HOSPITAL IN RELATION TO SOCIODEMOGRAPHIC FACTORS, CARDIAC HISTORY, AND CLINICAL SYMPTOMS.

VARIABLE	NO. OF PATIENTS*	MEDIAN TIME (MIN)†	P VALUE
Age			<0.01
<65 yr	491	119	
≥65 yr	840	149	
Sex			0.01
Male	878	130	
Female	453	149	
Race			0.81
White	1184	136	
Nonwhite	99	140	
Block-group median family income			0.17
<$35,000	500	143	
≥$35,000	679	130	
Block-group educational level‡			0.23
<10% of residents with less than a high-school education	475	129	
≥10% of residents with less than a high-school education	704	139	
Calendar year			0.31
1989	208	119	
1990	263	132	
1991	272	144	
1992	264	153	
1993	231	136	
1994	93	119	
Cardiac history			
Angina	423	137	0.91
No angina	908	136	
Myocardial infarction	240	122	0.10
No myocardial infarction	1091	139	
Heart failure	125	158	0.13
No heart failure	1206	135	
Thrombolytic therapy	10	119	0.70
No thrombolytic therapy	1046	131	
Coronary angioplasty	29	87	<0.01
No coronary angioplasty	1027	135	
Bypass surgery	109	135	0.94
No bypass surgery	1222	136	
Diabetes mellitus	205	179	<0.01
No diabetes mellitus	839	136	
Clinical symptoms			
Chest pain	994	128	<0.01
No chest pain	62	225	
Epigastric pain	78	166	0.03
No epigastric pain	795	127	
Nausea	311	119	0.04
No nausea	562	138	
Dyspnea	369	126	0.40
No dyspnea	504	132	
Diaphoresis	447	110	<0.01
No diaphoresis	426	168	
Syncope	20	109	0.23
No syncope	1036	132	
Shock	11	97	0.14
No shock	1045	131	
Copayment			0.91
0	729	136	
$25	308	135	
≥$50	294	138	

*The numbers of patients do not total 1331 for some covariates because of missing data.

†Median times (except age-specific medians) have been adjusted for age with Cox proportional-hazards analysis.

‡The educational level is expressed as the percentage of households in the patient's census block that were headed by someone with less than a high-school education.

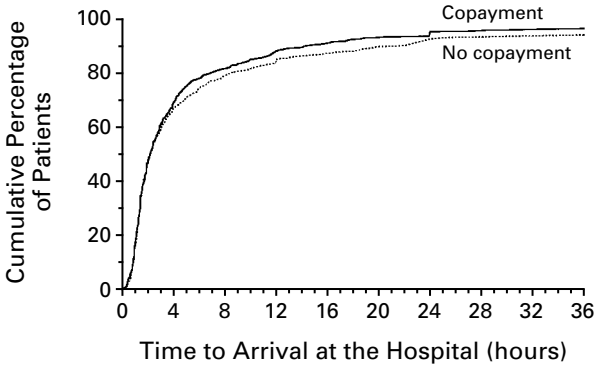

Figure 1. Cumulative Percentage of Patients Presenting at the Hospital Emergency Department at Any Given Time after the Onset of Symptoms, According to Copayment Status.

The figure is truncated at 36 hours; 4.2 percent of patients with myocardial infarction who were required to make a copayment and 6.6 percent of those with no copayment requirement arrived at the hospital more than 36 hours after the onset of symptoms.

with a $25 copayment, and 138 minutes for those with a copayment of $50 or more (Table 2).

We used proportional-hazards regression to estimate the effect of copayment requirements on time to arrival at the hospital, after adjusting for the potential confounding effects of demographic, socioeconomic, and clinical characteristics (Table 3). In a base-line model with adjustment for age, sex, and race, the median time to arrival at the hospital for the copayment group was 135 minutes and that for the no-copayment group was 137 minutes ($P = 0.88$; 95 percent confidence interval for the difference in the median time, −19 to +16 minutes). Little association between the presence or absence of a copayment requirement and time to arrival at the hospital was found in subsequent models, in which we also adjusted for the calendar year, neighborhood median income and education level, cardiac history, and clinical symptoms. In addition, we found no significant interactions between the effect of a copayment requirement and age, sex, race, cardiac history, amount of the copayment, median income, or educational level. The results were similar when adjusted analyses were performed separately for patients less than 65 years of age and 65 or older.

To determine whether the absence of association between copayment status and the time to arrival at the hospital was due to a patient's unawareness of his or her copayment status, we assessed the length of time to arrival in a subgroup of 305 patients who had a previous visit to the emergency department at a time when they had the same copayment status. In this analysis, the median time to arrival was 141 minutes in the copayment group and 164 minutes in the no-copayment group ($P = 0.28$).

TABLE 3. DIFFERENCE BETWEEN PATIENTS WITH COPAYMENT REQUIREMENTS AND THOSE WITH NO REQUIRED COPAYMENT IN THE MEDIAN TIME FROM THE ONSET OF SYMPTOMS OF MYOCARDIAL INFARCTION TO ARRIVAL AT THE HOSPITAL, AS DERIVED FROM PROPORTIONAL-HAZARDS MODELS.

MODEL	NO. OF PATIENTS*	DIFFERENCE IN MEDIAN TIME†	P VALUE
		minutes (95% CI)	
Base model (including copayment status, age, sex, and race)	1283	−2 (−19 to +16)	0.88
Base model plus educational level, income, and calendar year	1137	−4 (−19 to +18)	0.70
Base model plus clinical symptoms	829	−10 (−31 to +14)	0.33
Base model plus cardiac history	756	−1 (−23 to +31)	0.91

*The numbers of patients vary because of missing data on covariates.

†The differences shown are calculated as the median time in the copayment group minus that in the no-copayment group. CI denotes confidence interval.

Effects of Copayment Requirements on the Occurrence of Cardiac Arrest

To assess the likelihood that the requirement of an emergency department copayment led some patients with myocardial infarction to delay seeking care so long that they had a cardiac arrest, we compared the copayment status of Group Health enrollees who did and did not have cardiac arrest. The proportions with a required copayment were similar among the 449 persons who had cardiac arrest and the 920 persons who did not (48.3 percent and 49.5 percent). After adjustment for age, sex, and use of cardiac medications, there remained no significant association between copayment status and the occurrence of cardiac arrest (odds ratio for cardiac arrest in the copayment group as compared with the no-copayment group, 0.93; 95 percent confidence interval, 0.71 to 1.23).

Effects of Copayment Requirements on Mortality

There was no significant difference in the in-hospital case fatality rates in the copayment and no-copayment groups (5.2 percent and 6.4 percent, respectively; $P = 0.36$). After adjustment for sociodemographic characteristics, length of stay, and cardiac history, there was still no significant association between copayment status and in-hospital mortality (odds ratio for death in the copayment group as compared with the no-copayment group, 0.71; 95 percent confidence interval, 0.22 to 2.3). The long-term survival adjusted for sociodemographic characteristics and cardiac-history variables was also similar among the patients in the copayment and no-copayment groups who had been followed for a mean of 2.1 years (relative risk of death in the copayment group as compared with the no-copayment group, 1.05; 95 percent confidence interval, 0.73 to 1.50).

DISCUSSION

The objective of this study was to examine the effect of required copayments for emergency care on the time from the onset of symptoms of myocardial infarction to patients' arrival at the hospital. We found essentially no difference in the time to arrival at the hospital between patients with a copayment requirement and those without such a requirement. Adjusting for differences in demographic, socioeconomic, and clinical characteristics had little effect on these findings.

By focusing on a single clinical condition, we were able to assess whether copayment requirements had a measurable effect on length of time before patients sought care. In addition, we were able to assess the care-seeking behavior of Group Health enrollees in an entire community, because the MITI registry included patients with myocardial infarction who were admitted to any of the 19 acute care hospitals in King County. Furthermore, the extensive clinical and demographic data available from the registry allowed us to adjust for other differences among patients that might influence their care-seeking behavior.

The fact that studies conducted at Group Health and at other health plans have shown that copayment requirements reduce the use of medical services suggests that many patients are aware of their copayments.[1,2,16-19] We also identified a subgroup of patients who would be expected to know their copayment status because they had made a previous visit to the emergency department at a time when they had the same copayment requirement. The results of this analysis showed a similar absence of association between copayments and delays in seeking care.

It is possible that copayments increase the time from the onset of symptoms to arrival at the hospital but that our study did not have adequate statistical power to detect the difference. On the basis of the results of our primary regression model, in which we adjusted for base-line demographic factors, we can be approximately 95 percent confident that times to arrival at the hospital among patients with myocardial infarction who were required to make a copayment were not more than 16 minutes longer than those for similar patients with no copayment requirement. Differences of this magnitude in the length of time it takes patients to seek care are unlikely to be clinically significant.

To assess whether potential differences in the length of time to arrival at the hospital would result in adverse outcomes, we compared the hospital case fatality rates and long-term survival in the copayment and no-copayment groups. Although the power of our study to detect a difference was limited, we

found similar in-hospital case fatality rates and long-term survival in the two groups. These results are consistent with the fact that the two groups had similar base-line characteristics and care-seeking behavior. These findings are also consonant with those reported by Selby et al., who found similar short-term case fatality rates among patients with myocardial infarction with and without requirements for emergency department copayments.[2]

There are several limitations to our study. Our study population was not made up of all patients who presented with symptoms of possible myocardial infarction; however, our sample of patients with confirmed myocardial infarction included the subgroup of such patients for whom delays in obtaining medical care are of greatest importance. The effect of copayment requirements on patients with myocardial infarction who remained at home could not be directly assessed. Although it is possible that patients required to make copayments might be more likely to stay at home than patients with no copayment requirements, previous studies have shown that copayments do not reduce the use of emergency services for patients with conditions such as myocardial infarction, which are classified as "always an emergency."[2] In addition, we found no evidence to suggest that the requirement of an emergency department copayment led patients with myocardial infarction to delay going to the hospital so long that they sustained an out-of-hospital cardiac arrest.

This study evaluated the effect of copayment requirements on patients' care-seeking behavior; we did not assess the overall effect of managed care on the quality of care. Our study group included patients from a single HMO; we did not compare the length of time to arrival at the hospital for patients enrolled in the HMO with that for patients with other types of insurance. Finally, this study examined the effect of a modest, fixed copayment on the length of time it took patients to seek care; these results may not be generalizable to other health care systems or to patients whose insurance requires larger copayments or deductibles for emergency care.

Although we adjusted for known differences in the patients' base-line characteristics, bias may have been introduced by unmeasured differences between the copayment and no-copayment groups. Although the patients' reports of the time from the onset of symptoms to arrival at the hospital are commonly used to estimate delays in seeking care for patients with myocardial infarction, we had no objective information with which to validate patients' reports. Efforts to increase the public's awareness of the symptoms of myocardial infarction have been conducted in many locations, including King County.[20-25] It is possible that the requirement of copayments may result in longer delays in seeking care for patients with less easily recognizable conditions. Finally, previous studies suggest that cost sharing may have a greater effect on low-income patients than on others.[26-28] Although we found no significant interaction between income and the effect of a copayment requirement, this finding should be viewed with caution, since we used census-block data as a proxy for family income and because few indigent people are enrolled in the Group Health Cooperative of Puget Sound.

Strategies for sharing the costs of emergency services have been proposed as a way to reduce "inappropriate" visits to the emergency department. However, delays in receiving emergency care could result in avoidable adverse outcomes. In this study of privately insured patients enrolled in an HMO, the requirement of modest copayments for emergency services did not lead to delays in seeking care for myocardial infarction.

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