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MJ Sada, WJ French, DM Carlisle, NC Chandra, JM Gore, and WJ Rogers
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Influence of Payor on Use of Invasive Cardiac Procedures and Patient Outcome After Myocardial Infarction in the United States

MARK J. SADA, MD, WILLIAM J. FRENCH, MD, FACC, DAVID M. CARLISLE, MD, PhD,*
NISHA C. CHANDRA, MD,† JOEL M. GORE, MD, FACC,‡ WILLIAM J. ROGERS, MD, FACC,§
FOR THE PARTICIPANTS IN THE NATIONAL REGISTRY OF MYOCARDIAL INFARCTION||

Torrance and Los Angeles, California; Baltimore, Maryland; Worcester, Massachusetts; and Birmingham, Alabama

Objectives. We sought to determine the influence of payor status on the use and appropriateness of cardiac procedures.

Background. The use of invasive procedures affects the cost of cardiovascular care and may be influenced by payor status.

Methods. We compared treatment and outcomes of myocardial infarction among four payor groups: fee for service (FFS), health maintenance organization (HMO), Medicaid and uninsured. Multivariate comparison was performed on the use of invasive cardiac procedures, length of hospital stay and in-hospital mortality in 17,600 patients <65 years old enrolled in the National Registry of Myocardial Infarction from June 1994 to October 1995. To determine the appropriateness of coronary angiography, we compared its use in patients at low and high risk for cardiac events.

Results. Angiography was performed in 86% of FFS, 80% of HMO, 61% of Medicaid and 75% of uninsured patients. FFS patients were more likely to undergo angiography than HMO (odds ratio [OR] 1.27, 95% confidence interval [CI] 1.13 to 1.42),

Medicaid (OR 2.43, 95% CI 2.11 to 2.81) and uninsured patients (OR 1.99, 95% CI 1.76 to 2.25). Similar patterns for the use of coronary revascularization were found. Among those at low risk, FFS patients were as likely to undergo angiography as HMO patients but more likely than Medicaid and uninsured patients. For those at high risk, FFS patients were more likely to undergo angiography than patients in other payor groups. Adjusted mean length of stay (7.3 days) was similar among all payor groups, but adjusted mortality was higher in the Medicaid group (Medicaid vs. FFS: OR 1.55, 95% CI 1.19 to 2.01).

Conclusions. Payor status is associated with the use and appropriateness of invasive cardiac procedures but not length of hospital stay after myocardial infarction. The higher in-hospital mortality in the Medicaid cohort merits further study.

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The use of invasive procedures, such as coronary angiography, coronary angioplasty and coronary artery bypass graft surgery, contributes substantially to the overall cost of cardiovascular care (1). Several studies (2-6) implicate payor status as an influence on the delivery of cardiac care. However, many of these studies are limited by their use of administrative discharge data (2-4,6) which may not allow for appropriate adjustments for baseline differences among different payor groups. Moreover, it is not clear whether these differences in

use of procedures reflect overutilization in one payor group or underutilization in another.

In the present study, we used clinical data obtained through chart review to evaluate the effect of insurance status on the utilization and appropriateness of invasive cardiac procedures in a national cohort of patients admitted with an acute myocardial infarction (AMI).

Methods

National Registry of Myocardial Infarction. The National Registry of Myocardial Infarction (NRMI) is a multicenter, ongoing observational study designed to collect demographic, clinical, treatment and outcome data in patients with an AMI. Details of the first NRMI (7), which collected data from 1990 to 1994, have been described elsewhere. NRMI 2 collects more extensive data from 1,482 hospitals (26% of all medical/surgical hospitals [8] in the United States). Hospitals are encouraged to enroll consecutive patients, regardless of treatment strategy. To be included in the registry, patients are required to have experienced an AMI documented by local hospital criteria, typically with cardiac enzymes (creatinine kinase and its MB fraction) or electrocardiography. Data are collected through coordinators at each institution and sent to a

From the Department of Medicine, Division of Cardiology, Harbor-UCLA Medical Center, Torrance and *Department of Medicine, Division of General Internal Medicine, University of California Los Angeles, Los Angeles, California; †Department of Medicine, Coronary Care Unit, Johns Hopkins Bayview Medical Center, Baltimore, Maryland; ‡Department of Medicine, Division of Cardiovascular Medicine, University of Massachusetts Medical Center, Worcester, Massachusetts; and §Department of Medicine, Coronary Care Unit, University of Alabama Hospital, Birmingham, Alabama. ||A complete list of registry hospitals is available from Clin Trials, Inc., Lexington, Kentucky 40504. The National Registry of Myocardial Infarction is supported by Genentech, Inc., South San Francisco, California.

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Address for correspondence: Dr. William J. French, Division of Cardiology, Harbor-UCLA Medical Center, 1000 West Carson Street, Box 405, Torrance, California 90509. E-mail: wjrench@UCLA.edu.

Abbreviations and Acronyms

ACC/AHA	= American College of Cardiology/American Heart Association
AMI	= acute myocardial infarction
CI	= confidence interval
FFS	= fee for service
HMO	= health maintenance organization
MI	= myocardial infarction
NRMI	= National Registry of Myocardial Infarction
OR	= odds ratio

central collection center (ClinTrials Research, Inc.) for analysis. Registry coordinators attend a training course and are provided reference manuals. Double-key entry is used by the data collection center with electronic audits to detect errors, omissions and out of range variables. Queries are telephoned to local coordinators for resolution. Periodic regional meetings of registry coordinators and investigators are held to discuss data entry and registry findings.

Payor status. Information regarding payor status was obtained in 97% of registry patients. Fee for service (FFS) patients included all patients with traditional indemnity insurance, as well as those enrolled in preferred provider organizations (PPOs). Health maintenance organization (HMO) patients included those enrolled in staff, group or network model HMOs and individual practice associations (IPA). Medicaid patients were enrolled in state or federal programs for low income individuals. Uninsured patients were those without identifiable insurance.

Hospital and regional characteristics. Demographic data characterizing registry hospital size, capability of providing invasive cardiac procedures, teaching status and rural or urban location were obtained from SMG Marketing Group, Inc. Eight regions were constructed to reflect U.S. census data.

Discretionary and nondiscretionary angiography. To determine the extent of *discretionary* cardiac catheterization, we identified a population at low risk for future cardiac events. The Joint Task Force of the American College of Cardiology and the American Heart Association (ACC/AHA) considers angiography in this group "not ordinarily justified" (9). Low risk patients met all of the following criteria: 1) no history of myocardial infarction (MI) or heart failure before hospital admission; 2) Killip class I on admission; 3) no development of heart failure, cardiogenic shock, hypotension requiring intervention, recurrent ischemia or infarction or sustained ventricular arrhythmia during the hospital course; 4) Q wave MI; and 5) no evidence of inducible myocardial ischemia. Because the database did not include results of stress testing, only patients who did not undergo stress testing fulfilled the last of these criteria.

Conversely, the ACC/AHA task force recommends cardiac catheterization in post-MI patients with unfavorable prognoses in whom revascularization is likely to confer a survival benefit (9). On this basis, we defined a catheterization as *nondiscre-*

tionary if patients met one of the following criteria: 1) cardiogenic shock; 2) recurrent myocardial ischemia or MI; or 3) clinical evidence of heart failure on admission or during the hospital course. Patients with severe left ventricular dysfunction (left ventricular ejection fraction <20%) or medical comorbidities such as stroke were excluded because they may not be suitable candidates for revascularization.

Study criteria. Patients were included in the study if they met all of the following criteria: 1) direct admission to a hospital capable of providing invasive cardiac procedures; 2) age >65 years; 3) primary payor listed as FFS, HMO or Medicaid or uninsured; 4) angioplasty not performed as primary reperfusion therapy; and 5) not transferred to another hospital. Patients ≥ 65 years were excluded from the analysis because Medicare was the primary payor for >90% of these patients. Patients admitted to hospitals incapable of providing invasive cardiac procedures or transferred to other hospitals were excluded because the registry did not contain information on treatment or outcome after transfer to another facility.

Analysis of data. To compare baseline differences among the payor groups, we used the Student-Neuman-Keuls test for continuous variables and the chi-square test with the Bonferroni correction for dichotomous variables (10). Logistic models were constructed to determine the relation between payor status and the use of invasive cardiac procedures. Clinically relevant variables were entered into the models regardless of p values obtained on univariate analysis. These included hospital, regional, clinical and demographic variables present on admission and in-hospital events that could influence the decision to perform invasive procedures, such as thrombolytic therapy, stroke, heart failure, cardiogenic shock, ventricular arrhythmias, recurrent ischemia or infarction. The variable for payor status was forced into the model as the last step.

A separate logistic model incorporating patient demographic and hospital characteristics was constructed to determine the relation between payor status and angiography in low and high risk populations. A linear regression model was used to determine the relation between payor status and length of stay. Because length of stay was not normally distributed, we used the log transformation of length of stay as the dependent variable in this model. Clinically relevant variables present at the time of admission, treatment variables and interaction terms were entered into the model with payor status forced into the model as the final step.

A logistic model incorporating variables present at the time of admission was constructed to determine the relation between payor status and in-hospital mortality. Stepwise regression was performed, with the variable for payor status forced in as the last step. Treatment variables found to be related to mortality on univariate testing (aspirin, thrombolytic therapy, heparin, beta-adrenergic blocking agents, nitroglycerin, coronary angioplasty and bypass surgery) were then entered into the model in stepwise fashion to determine their contribution to payor-related mortality differences. Statistical analyses were performed using Statistical Analysis Systems (SAS), version 6.04.

Table 1. Demographic and Clinical Characteristics of Study Patients According to Payor Status

	FFS (n = 10,498)	HMO (n = 3,273)	Medicaid (n = 1,354)	Uninsured (n = 2,475)
Demographic variables				
Age (yr)*	54.2 ± 10.2	53.4 ± 5.7	53.0 ± 7.4	51.5 ± 9.9
White race†	86.1%	80.3%	60.7%	73.1%
Male gender*	78.3%	74.7%	54.4%	75.2%
Weight (kg)‡	86.4 ± 19.7	86.5 ± 16.5	82.6 ± 21.2	84.3 ± 19
Clinical history				
Diabetes§	19.6%	20.8%	37.4%	17.9%
MI§	19.5%	19.5%	31.2%	18.9%
CHF§	3.4%	3.9%	14.0%	3.3%
Angina§	13.9%	13.6%	20.6%	11.3%
Angioplasty	9.8%	10.0%	10.3%	5.8%
Bypass surgery	10.6%	10.2%	11.2%	5.4%
Stroke§	2.2%	3.3%	7.6%	2.4%
Admission characteristics				
Pulse rate (beats/min)§	81.3 ± 20.4	81.3 ± 22.8	88.6 ± 25.7	83.0 ± 24.7
SBP (mm Hg)¶	143.3 ± 30.6	143.2 ± 28.5	141.2 ± 36.7	142.2 ± 34.7
Killip class I§	89.3%	88.0%	78.1%	86.2%
Cardiogenic shock¶	0.7%	0.9%	1.4%	1.5%
ST segment elevation‡	51.2%	51.5%	43.7%	56.7%
MI type				
Anterior	26.5%	25.8%	26.9%	31.6%
Q wave‡	58.8%	57.5%	49.7%	62.7%

*p < 0.01, fee for service (FFS) versus non-fee for service and uninsured versus insured. †p < 0.01 for all groups. ‡p < 0.01, private (fee for service and health maintenance organization [HMO]) versus nonprivate (Medicaid and uninsured) and Medicaid versus uninsured. §p < 0.01, Medicaid versus non-Medicaid. ||p < 0.01, uninsured versus insured. ¶p = NS. Data presented are mean value ± SD or percent of patients. CHF = congestive heart failure; MI = myocardial infarction; SBP = systolic blood pressure.

Results

Study patients. From June 1994 to October 1995, 184,262 patients were enrolled in NRMI 2, with 55,607 patients <65 years old directly admitted to registry hospitals. Of these patients, approximately half (n = 27,775) were admitted to hospitals capable of performing invasive cardiac procedures, with 3,875 undergoing primary angioplasty and 2,965 transferred to other facilities. Of the remaining 20,935 patients, 17,600 met payor status criteria and were included in the analysis.

The study population of 17,600 patients included 10,498 FFS (59.6%), 3,273 HMO (18.6%), 1,354 Medicaid (7.7%) and 2,475 uninsured patients (14%). There were substantial differences in baseline characteristics between payor groups (Table 1). FFS patients were older and more likely to be white or male than patients in other payor groups but were otherwise comparable to HMO patients. Medicaid patients were more likely to be nonwhite and female, have a higher incidence of diabetes and previous cardiovascular events and a higher heart rate and Killip class on admission than patients in other payor groups. Uninsured patients were younger than patients in other payor groups. Although their Killip class and cardiac history were similar to those of FFS and HMO patients, they were much less likely to have undergone revascularization before the index hospital stay.

Hospital and regional characteristics. FFS patients were less likely to be admitted to teaching hospitals (15.6% FFS vs.

24.5% non-FFS, p < 0.001), whereas HMO patients were less likely to be admitted to rural hospitals (1.3% HMO vs. 5.5% non-HMO, p < 0.001). The proportion of FFS, HMO, Medicaid and uninsured patients varied substantially according to region. The proportion of HMO patients was highest in the West (25.4%) and Northeast (34.8%) and lowest in the Southeast (10.1%).

Cardiac procedures. During the hospital stay, 81.1% of all study patients underwent angiography, 33.3% underwent coronary angioplasty, and 17.7% underwent bypass surgery. The use of cardiac procedures differed markedly among payor groups (Table 2). In general, angiography and revascularization were performed more often in FFS and HMO patients than in Medicaid and uninsured patients. FFS patients underwent angiography and bypass surgery more often than HMO patients, but a similar proportion underwent angioplasty. Multivariate analysis revealed that the odds of an FFS patient undergoing angiography were 144% greater than a Medicaid patient, 99% greater than an uninsured patient and 30% greater than an HMO patient (all p < 0.001). Figure 1 depicts the association of payor status with the use of angiography in relation to several clinical factors.

Similar results were found in a multivariate analysis of utilization of coronary revascularization procedures. FFS patients were 54% more likely than Medicaid patients and 32% more likely than uninsured patients to undergo coronary angioplasty (p < 0.001) but were as likely to undergo the

Table 2. Use of Cardiac Procedures in Study Patients According to Payor Type

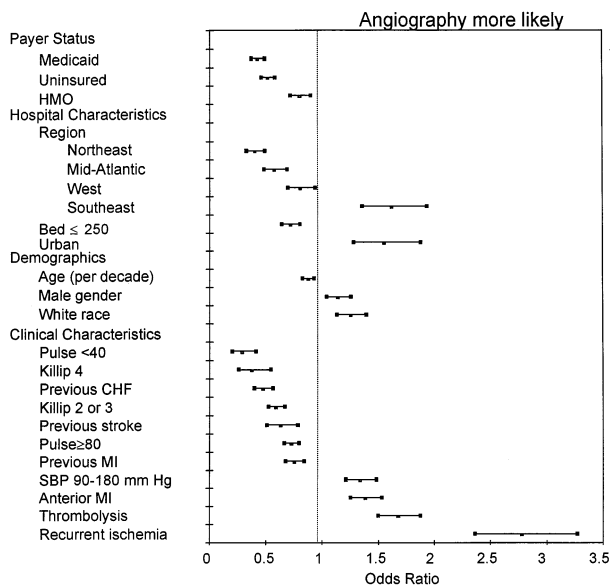
	FFS (n = 10,498)	HMO (n = 3,273)	Medicaid (n = 1,354)	Uninsured (n = 2,475)
Invasive				
Angiography*	85.5%	80.4%	61.0%	74.9%
Angioplasty†	35.6%	34.0%	20.8%	29.3%
Bypass surgery‡	19.4%	16.1%	11.0%	13.5%
Other				
Echocardiography§	42.2%	40.8%	50.2%	44.6%
IABP	6.6%	5.6%	5.8%	5.2%
Mechanical ventilation¶	18.0%	15.3%	18.4%	14.4%
Pacemaker #	4.2%	3.2%	4.1%	4.3%
Stress testing¶¶	15.4%	19.6%	16.9%	16.5%

*p < 0.01 between all groups. †p < 0.01, private versus nonprivate, Medicaid versus uninsured. ‡p < 0.01, private versus nonprivate, fee for service (FFS) versus health maintenance organization (HMO). §p < 0.01 Medicaid versus non-Medicaid. ||p = NS. #Includes transvenous or permanent; data on left ventricular ejection reaction available for 65% of study patients. ¶p < 0.01, HMO versus non-HMO. Data presented are percent of patients. IABP = intraaortic balloon pump.

procedure as HMO patients. FFS patients were more likely to undergo bypass surgery than HMO, Medicaid and uninsured patients (p < 0.001), whereas Medicaid and uninsured patients were equally likely to undergo surgical revascularization.

Discretionary and nondiscretionary angiography. Twenty percent of the study population was at low risk and 22% at high risk for future cardiac events. Angiography was performed in 90.4% of low risk patients (discretionary procedures) but in only 78.1% of high risk patients (nondiscretionary procedures).

Figure 1. Odds ratios with 95% confidence intervals for factors influencing use of angiography in 17,600 patients admitted to the hospital with an AMI. FFS was used as the reference category for payor status comparisons, Great Lakes as the reference category for regional comparisons and pulse rate 40 to 80 beats/min as the reference category for heart rate. Odds ratios to the left of the dashed line indicate that angiography was less likely, those to the right of the dashed line that it was more likely. CHF = congestive heart failure; SBP = systolic blood pressure.



Significant differences in the use of discretionary and nondiscretionary angiography among the payor groups were found (Table 3). After we adjusted for different hospital and demographic characteristics among groups, discretionary angiography was shown to be performed more frequently in low risk patients with FFS or HMO insurance (combined FFS and HMO vs. combined Medicaid and uninsured patients: odds ratio [OR] 2.61, 95% confidence interval [CI] 1.82 to 3.61). Of note, low risk FFS and HMO patients were equally likely to undergo angiography, as were low risk Medicaid and uninsured patients. Multivariate adjustment revealed that nondiscretionary angiography was more likely to be performed in high risk FFS patients than in high risk HMO (OR 1.45, 95% CI 1.19 to 1.75), Medicaid (OR 3.13, 95% CI 2.50 to 3.85) or uninsured patients (OR 2.08, 95% CI 1.69 to 2.52).

Patient outcomes. The mean length of stay was 7.2 days for FFS patients, 6.9 days for HMO patients, 8.4 days for Medicaid patients and 6.9 days for uninsured patients (p < 0.001). However, in the multivariate analysis, mean length of stay (7.3 days) was similar among all payor groups (p > 0.05).

The incidence of adverse events was similar among FFS, HMO and uninsured patients, but heart failure and death were higher in the Medicaid group (Table 4). After adjustment of the model for variables present on admission, Medicaid patients were more likely to die than were FFS patients (Medicaid vs. FFS: OR 1.55, 95% CI 1.19 to 2.01). Adjusted mortality rates were similar among FFS, HMO and uninsured patients (Fig. 2). After adjustment of the model for differences in treatments, Medicaid patients were still 40% more likely to die than either FFS, HMO or uninsured patients (Medicaid vs. FFS: OR 1.40, 95% CI 1.04 to 1.87). Thus, process of care accounted for some but not all of the mortality difference.

Discussion

Our findings demonstrate that payor status is strongly associated with the use of invasive cardiac procedures in

Table 3. Use of Discretionary and Nondiscretionary Angiography in Study Patients According to Payor Type

	FFS (n = 10,498)	HMO (n = 3,273)	Medicaid (n = 1,354)	Uninsured (n = 2,475)
Low risk pts*†	23.5%	21.5%	14.0%	22.8%
High risk pts*†	27.2%	26.8%	34.5%	29.7%
Angiography				
Discretionary (low risk pts)‡	92.7%	92.3%	81.1%	84.0%
Nondiscretionary (high risk pts)§	83.6%	78.0%	60.2%	72.6%

*p < 0.001, Medicaid versus non-Medicaid. †See text for definition of low and high risk. ‡p < 0.001, private versus nonprivate. §p < 0.001 between all groups. Data presented are percent of patients (pts). Other abbreviations as in Table 1.

patients 65 years of age. Coronary angiography, coronary angioplasty and bypass surgery were performed more frequently in patients with FFS service or HMO insurance than in those with Medicaid or no insurance. Moreover, FFS patients were more likely to undergo angiography and bypass surgery than were HMO patients.

Appropriateness of invasive procedures. Although some have recommended routine angiography in all post-MI patients (11), this approach is neither supported by randomized trials (12,13) nor recommended by consensus panels (9,14). The Joint Task Force of the ACC/AHA recommends angiography in post-MI patients who are at high risk for subsequent cardiac events but not in those with otherwise favorable prognoses (9). Our data reveal that in a national cohort of post-MI patients, these recommendations are not being followed. Patients at high risk for cardiac events, in whom revascularization would be most likely to confer a survival benefit, were less likely to undergo cardiac catheterization than those with a more favorable prognosis. The reasons for this are unclear and may represent a lack of physician awareness of guideline recommendations. Alternatively, physicians may be reluctant to perform procedures in patients at increased risk for a poor outcome. After Pennsylvania published risk-adjusted mortality rates for bypass surgery, 59% of cardiologists reported increased difficulty in finding surgeons willing to perform bypass surgery in severely ill patients (15). We hypoth-

esized that more aggressive cost-containment measures, such as those found in many HMOs (16), would have their most pronounced effect on the utilization of discretionary procedures. Indeed, previous studies of care among HMO and FFS systems have shown a lower use of discretionary services among HMO patients (17,18). We were thus surprised to find that low risk HMO and FFS patients were equally likely to undergo discretionary angiography. In contrast, nondiscretionary angiography was significantly lower in high risk HMO patients than in similar FFS patients. This finding raises concern because overall health care benefit may suffer if utilization of nondiscretionary procedures is selectively reduced.

Financial disincentives to care for both Medicaid and uninsured patients may make hospitals and physicians less willing to perform invasive cardiac procedures. We demonstrated a reduction in both discretionary and nondiscretionary procedures in these payor groups. Nevertheless, >80% of low risk Medicaid and uninsured patients underwent angiography. Thus, despite financial pressures, physicians are not directing the use of invasive procedures to those patients most likely to benefit.

Strengths of analysis. To our knowledge, our study represents the first to investigate the influence of payor among a national cohort of post-MI patients and the first to investigate the appropriateness of cardiac procedure use among different

Table 4. Adverse Events* in Study Patients According to Payor Type

	FFS (n = 10,498)	HMO (n = 3,273)	Medicaid (n = 1,354)	Uninsured (n = 2,475)
Hypotension†	12.6%	12.7%	14.3%	15.1%
Recurrent angina†	13.8%	12.6%	14.5%	13.8%
Recurrent MI†	2.6%	2.6%	2.7%	1.9%
CHF‡	8.6%	8.5%	16.0%	9.7%
Cardiogenic shock†	3.0%	2.6%	4.5%	3.6%
Sustained ventricular arrhythmia†	7.3%	6.5%	7.5%	8.0%
Cardiac rupture†	0.6%	0.4%	0.8%	1.1%
Cardiac arrest†	2.9%	3.1%	4.5%	3.7%
Stroke†	0.8%	0.9%	1.6%	0.8%
Major bleeding†	2.0%	2.2%	2.4%	1.9%
Death‡	3.8%	3.9%	8.9%	5.4%

*Hypotension requiring intervention; major bleeding requiring transfusion. †p = NS. ‡p < 0.01 Medicaid versus non-Medicaid. Abbreviations as in Table 1.

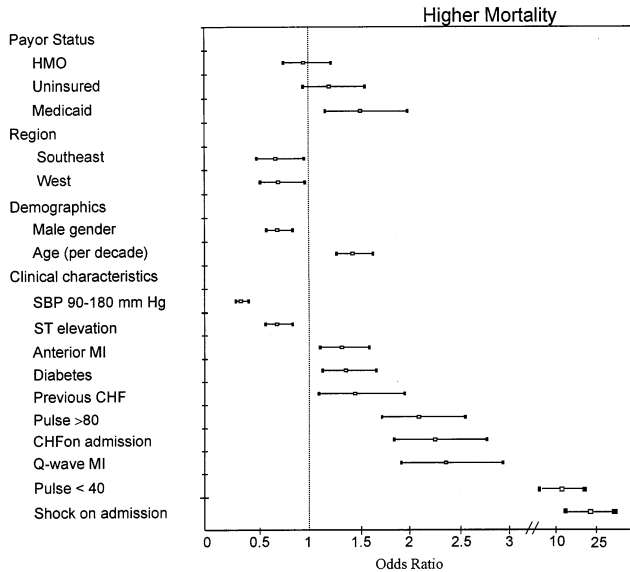


Figure 2. Odds ratios with 95% confidence intervals for factors influencing in-hospital mortality in 17,600 patients admitted to the hospital with an AMI. FFS was used as the reference category for payor status comparisons, Great Lakes as the reference category for regional comparisons and pulse rate 40 to 80 beats/min as the reference category for heart rate. Odds ratios to the left of the **dashed line** indicate that mortality was less likely, those to the right of the **dashed line** that it was more likely. Abbreviations as in Figure 1.

payor groups. The strength of this analysis rests on its use of detailed clinical data collected by trained abstractors. Several investigators (2,4,6,19) have drawn conclusions about health care quality using administrative discharge data, but this form of data is controversial because it may not adequately adjust for case mix (20,21). Our data, which included several important clinical and physiologic variables present at the time of admission, allow valid comparison of utilization, appropriateness and outcome of care.

Length of stay. Length of hospital stay is an important determinant of the total cost of care (22). However, we found no significant differences in adjusted length of stay among payor groups. Financial pressures to limit length of stay, traditionally associated with HMO systems, are now present among other payor groups and may well explain our findings. Although knowledge of a patient's coronary anatomy may allow for earlier discharge, we found no evidence that payor systems that used more angiography had shorter lengths of stay.

In-hospital outcomes. Our analysis points to a higher risk-adjusted mortality among Medicaid patients than in other payor groups. These findings are consistent with those of a previous study using administrative discharge data (4). The mortality difference persisted even after incorporating treatments such as coronary angioplasty and bypass surgery into the adjustment models. Thus, we are unable to fully explain outcome differences on the basis of treatments received. It is unclear whether these outcome differences are due to unmeasured

differences in quality of care or to differences in comorbidities not accounted for in the risk-adjustment model.

Despite a lower use of nondiscretionary angiography in HMO and uninsured patients than in FFS patients, we found no difference in adjusted in-hospital mortality. It is therefore tempting to conclude that overall health care benefits did not suffer in systems that used fewer invasive procedures. However, this finding must be viewed with caution for several reasons: 1) Our study may not be adequately powered to detect a mortality difference; 2) a longer follow-up period may be necessary to show a survival benefit; and 3) we did not measure functional status at discharge or at follow-up, an important measure of outcome.

Study limitations. Our study has potential limitations that merit discussion: 1) Although several quality control measures were taken to ensure that registry data were consistent and reliable, the data set was not validated through independent chart review. 2) We lacked data on the treatment and outcome of patients transferred to other acute care facilities and thus were forced to exclude them from analysis. However, only 10% of patients admitted to hospitals capable of providing invasive procedures underwent transfer, with FFS patients more likely to be transferred for procedures than patients in other payor groups. 3) We do not have data on procedure use after discharge. Although a previous analysis of the use of post-MI outpatient catheterization showed no difference between FFS and HMO plans (23), this procedure may be performed to a varying extent among other payor groups. 4) We could not assess the extent of patient refusal of procedures. Payor type has been shown to influence patient behavior. In the RAND health experiment (24), patients randomized to plans with deductibles and copayments were less likely to use some outpatient services. Similarly, uninsured patients, who are at full financial liability for their medical expenses, may be reluctant to accept expensive procedures offered them. 5) We do not have data regarding physician form of reimbursement (e.g., salaried vs. nonsalaried), whether HMO patients were seen on a FFS or capitated basis or whether physicians were aware of the patient's insurance status at the time of decision making. All these factors might influence the use of invasive procedures.

Finally, we did not evaluate the effect of payor on functional status, morbidity or mortality after discharge. The mortality benefit from surgical revascularization may not be seen for several years (25). A study comparing practice patterns in the United States with those in Canada (26) showed that the lower use of invasive cardiac procedures in Canada led to measurable differences in morbidity and functional status. We are unaware of analyses of the effect of payor status that incorporate measures of functional status and long-term outcomes.

Conclusions. Rising health care costs have led to dramatic restructuring of the financing of health care in the United States. Our findings provide some insight into the effects of various payor arrangements on the delivery, quality and outcome of cardiac care. The influence of payor on functional status and long-term morbidity and mortality after MI requires further study.

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MJ Sada, WJ French, DM Carlisle, NC Chandra, JM Gore, and WJ Rogers
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