UNSTABLE ANGINA

Influence of Insurance Type on the Use of Procedures, Medications and Hospital Outcome in Patients With Unstable Angina: Results from the GUARANTEE Registry

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Objectives. The purpose of this study was to investigate whether or not there is an association between managed care insurance and the delivery and outcome of care in patients presenting with unstable angina.

Background. The proportion of U.S. patients with managed care health insurance is increasing. This may be associated with recent improvements in the control of health care costs. It is unknown whether or not there is a difference in process of care in angina patients presenting with managed care versus fee-for-service health insurance.

Methods. We compared baseline characteristics, process and outcome of care in 636 patients with managed care insurance (MC) and 1,404 patients with fee-for-service (FFS) insurance who presented with unstable angina to 35 hospitals participating in the global Unstable Angina Registry and Treatment Evaluation (GUARANTEE) Registry.

Results. Although, there was little difference in baseline characteristics and hospital treatments between cohorts, MC patients were more likely to be discharged on guideline-recommended medications (aspirin and beta-adrenergic blocking agents). In addition, FFS patients were more likely to undergo cardiac catheterization (odds ratio = 1.25 95% confidence interval = 1.1 to 1.5), but not revascularization during the hospitalization. There was no difference in hospital mortality (0.9% versus 1.2% in MC versus FFS; p = 0.60).

Conclusions. In patients admitted with suspected unstable angina, MC patients are less likely to undergo coronary angiography, but are more likely to be discharged on indicated medications.

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The rate of growth of United States (U.S.) medical expenditures has decreased in the past several years as a result of, in part, the growth of managed care plans (1–3). Although there are differences in the organizational detail of these plans, as a whole, managed care plans attempt to control resource utilization through administrative efforts that encourage preventive services and discourage the use of specialists and procedures (4). These mechanisms include the use of primary care or “gatekeepers” to control access to specialists, the use of capitation, as well as the use of salaried physicians to eliminate financial incentives to perform procedures.

Previous studies that compared resource utilization in patients in fee-for-service versus managed care systems have shown that lower costs attributed to managed care were a result of decreased admission among enrollees, as well as shorter hospital stays for specific conditions (4–6). In patients with acute myocardial infarction (AMI), those admitted to staff-model health maintenance organization hospitals were less likely to undergo invasive cardiac procedures than patients admitted to fee-for-service hospitals (7). Although no major differences in hospital mortality have been reported, there remains a concern that the cost reduction strategies used by managed care organizations could result in reduced quality of care in hospitalized patients (8,9).

For patients admitted with the presumed diagnosis of unstable angina, there is more diagnostic uncertainty that those patients with AMI (10,11). In addition, there is probably more variation in care in these patients as fewer therapies have proven efficacy in this population of patients (12). To evaluate...
whether or not insurance status is associated with differences in process or outcome of care in unstable angina patients, we analyzed insurance status in a large national registry of patients admitted with chest pain and the presumed diagnosis of unstable angina.

## Methods

### Patients

The subjects of this study were 2,948 patients admitted to 1 of 35 hospitals participating in the Global Unstable Angina Registry and Treatment Evaluation (GUARANTEE). The GUARANTEE Registry was an investigator-initiated study that attempted to document current treatment and outcome in a cross-sectional sample of unstable angina patients admitted to a wide variety of U.S. hospitals. Consecutive patients with the admission diagnosis consistent with unstable angina were included in the Registry. In addition to the admission diagnosis of unstable angina, Registry patients also included those with the admission diagnosis of coronary artery disease, acute coronary syndromes, “rule-out myocardial infarction” or chest pain. Exclusion criteria included AMI with ST-segment elevation, admission for a planned coronary revascularization procedure or noncardiac chest pain. To maintain geographic balance, no more than 200 patients from each participating medical center could be included in the registry (mean enrollment per site 84 ± 39 patients). Dates of enrollment were from September 1995 through August 1996. Eighty-six percent of GUARANTEE Registry hospitals had on-site cardiac catheterization facilities and 72% had on-site coronary bypass surgery facilities.

To investigate the association between insurance status and process and outcome of care we divided the Registry into patients with fee-for-service (FFS) or managed care (MC) insurance. Insurance status was obtained from chart review and collected from the primary payor information on the demographic sheet. For patients with supplemental insurance coverage, only the primary payor was used for insurance classification. Fee-for-service patients included those with FFS indemnity insurance (16%) as well as FFS Medicare (23%). The managed care group included MC patients as well as Medicare MC (2%). Specific details of the MC insurance (e.g., staff model) were not collected. Self-pay (11%) and Medicaid patients (11%) were excluded from the analysis. Additional analyses were performed after excluding Medicare patients from the FFS cohort.

### Data collected

Research coordinators at each site completed the three-page case report form. Data were collected on basic demographic information, admitting physician specialty, past medical history, hospital presentation, medication use on admission and at discharge, invasive and noninvasive procedure use, as well as hospital complications and outcome. ICD-9 discharge diagnoses were also collected.

### Statistical methods

We used chi-square and Student’s t tests to test for differences in baseline characteristics between patients with FFS versus MC insurance. Comparison of length-of-stay was made using the Mann-Whitney two-sample test (13). “Appropriate catheterization” was based on the Agency for Health Care Policy and Research (AHCPR) guidelines for the diagnosis and management of unstable angina (14). To test whether FFS patients were more likely to undergo cardiac catheterization or coronary revascularization (defined as the use of coronary angioplasty or bypass surgery during the index hospitalization), we constructed a series of logistic regression models. Variables that were significantly associated with cardiac catheterization in univariate comparisons (p < 0.10), as well as those variables we considered clinically relevant, entered the multivariate model in a stepwise fashion, with insurance type (MC versus FFS) forced into the model at the final step. These variables included age, gender, race, admission electrocardiogram (ECG), smoking status, history of angina, myocardial infarction, heart failure, stroke, diabetes, angioplasty or bypass surgery as well as “ruling in” for myocardial infarction during the hospital stay. Similar models were developed for the use of appropriate catheterization (as defined by AHCPR guidelines) as well as revascularization with the same variables entering the mode. The multivariate association between insurance type and the use of beta-adrenergic blocking agents as well as the use of aspirin on discharge used the same set of adjustment variables with the addition of a history of peptic ulcer disease as well as the use of coronary angioplasty or bypass surgery during the hospital stay.

To evaluate whether length-of-stay in MC patients was different than FFS hospitals, we used a linear regression model to calculate length-of-stay after adjusting for differences between cohorts. Variables contained in this model included age, gender, race, admission ECG, history of angina, myocardial infarction, heart failure, stroke, diabetes, angioplasty or bypass surgery, “ruling in” for myocardial infarction during the hospital stay, as well as the use of coronary angioplasty or bypass surgery. Because the distribution of length-of-stay was not normal, we used the logarithmic transformation of length of stay as the dependent variable in this model.

Because a large proportion of FFS patients had Medicare insurance, a separate analysis was performed after excluding patients with Medicare insurance. Univariate and multivariate comparisons as described above were performed in this subgroup of patients.
Baseline characteristics. A total of 2,948 patients were included in the Registry. The mean age of the cohort was 62 ± 13 years and 61% were male. In this group of patients admitted with presumed unstable angina, 11% eventually were diagnosed with a myocardial infarction and 32% were eventually diagnosed with noncardiac chest pain.

In the primary comparison there were 636 patients with MC insurance and 1,404 patients with FFS insurance. Overall, the proportion of MC patients admitted to the 31 participating hospitals was 31.2% (range 0% to 85%). On the basis of the four census regions, MC insurance was most common in the western United States (west 42.0%, northeast 35.1%, midwest 27.1%, and south 11.4%). Fee-for-service patients were older (66.8 ± 13.0 versus 61.1 ± 12.9 p = 0.001), more likely to be women, and more likely to be white race than MC patients (Table 1). Past medical histories were similar, although FFS patients were less likely to be diabetic or current smokers and more likely to have had previous heart failure.

Process of care. Process of care after hospital presentation was similar in patients with FFS versus MC insurance (Table 2). The majority of patients were under the primary care of a cardiologist with FFS patients less likely to be cared for by a cardiologist (69% versus 74% p = 0.001 for FFS and MC patients, respectively). More FFS patients were likely to have had previous heart failure (12% versus 17% p = 0.005), be treated with beta-blockers (54% versus 60% p = 0.009), and calcium channel blockers. Managed care patients were more likely to undergo bypass surgery (10.0% versus 6.6% p = 0.013). Length of hospital stay was 0.6 days longer in FFS patients (4.3 ± 4.4 versus 3.7 ± 3.5 days; p = 0.008). There was no difference in length of hospital stay between cohorts after multivariate adjustment (beta = 0.007; p = 0.71).

To evaluate the association between insurance type and the use of invasive cardiac procedures independent of differences in baseline characteristics, we performed a series of logistic regression models. Factors that were associated with a greater likelihood of undergoing cardiac catheterization included white race, younger age, previous use of angiolast, previous angina, abnormal admission electrocardiogram, as well as tively), coronary angiography (51% versus 48% p = 0.2) or coronary interventions (17% versus 19% p = 0.242) (Table 2).

There was no difference in the proportion of patients who underwent appropriate coronary angiography according to the AHCPR guidelines (73% versus 73% p = 0.82). There was no association between insurance type and the use of appropriate coronary angiography after multivariate adjustment (odds ratio = 0.92 95% CI = 0.63 to 1.3). Fee-for-service patients were more likely to undergo bypass surgery (10.0% versus 6.6% p = 0.013). Length of hospital stay was 0.6 days longer in FFS patients (4.3 ± 4.4 versus 3.7 ± 3.5 days; p = 0.008). There was no difference in length of hospital stay between cohorts after multivariate adjustment (beta = 0.007; p = 0.71).

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ruling-in for a myocardial infarction during the hospitalization (Fig. 2). Factors associated with a lower likelihood of undergoing catheterization included female gender and previous myocardial infarction, stroke or heart failure. After adjusting for these factors, FFS patients were more likely than MC patients to undergo cardiac catheterization (odds ratio = 1.25; 95% CI = 1.1 to 1.5). For patients who underwent cardiac catheterization, there was no association between insurance status and the use of revascularization (odds ratio = 1.0; 95% CI = 0.75 to 1.4).

In-hospital outcomes were similar between cohorts. Although FFS patients were more likely to develop a myocardial infarction within 16 h of admission, there were no differences in the proportion of patients who had recurrent myocardial infarction or who developed recurrent chest pain or stroke (Table 3). There was no difference in hospital mortality (1.2% versus 0.9% in FFS versus MC; p = 0.595).

**Non-Medicare fee-for-service subgroup.** Because the analysis may have been confounded by including Medicare patients in the FFS cohort, we repeated the comparison but included only those with non-Medicare indemnity insurance in the FFS cohort. In this comparison there were 623 MC patients and 807 FFS patients. After excluding Medicare patients, the FFS cohort. In this comparison there were 623 MC patients and 807 FFS patients. After excluding Medicare patients, the FFS and 636 MC patients admitted to 35 U.S. hospitals with the admission diagnosis of unstable angina, we found modestly higher use rates of guideline-recommended medications in MC patients. At hospital discharge, MC patients were more likely to be discharged on aspirin or beta-blockers. Managed care patients were also more likely to be discharged on calcium similar to the principal analysis. Fee-for-service patients were less likely to be discharged on aspirin (65% versus 75%; p < 0.001), beta-blockers (36% versus 47%; p < 0.001) as well as calcium channel blockers (30% versus 38%; p = 0.001). There was no difference in the use of invasive cardiac procedures (coronary angiography 51% versus 48% p = 0.379; coronary intervention 17% versus 19%; p = 0.359 or bypass surgery 8% versus 7%; p = 0.225 in FFS versus MC, respectively). After multivariate adjustment, however, FFS patients were more likely to undergo coronary angiography (odds ratio = 1.3; 95% CI = 1.04 to 1.64), but there was no difference in the use of revascularization (odds ratio = 1.1; 95% CI = 0.85 to 1.4).

**Table 3. Hospital Outcomes in Patients With Fee-for-Service Versus Managed Care Insurance**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Managed Care (n = 636)</th>
<th>Fee-for-Service (n = 1,404)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocardial infarction (&lt;16 h after admit) (%)</td>
<td>10</td>
<td>13</td>
<td>0.032</td>
</tr>
<tr>
<td>Additional in-hospital chest pain (%)</td>
<td>30</td>
<td>30</td>
<td>0.690</td>
</tr>
<tr>
<td>Recurrent infarct (%)</td>
<td>1</td>
<td>1</td>
<td>0.592</td>
</tr>
<tr>
<td>Stroke (%)</td>
<td>0.5</td>
<td>0.3</td>
<td>0.684</td>
</tr>
<tr>
<td>Death (%)</td>
<td>0.9</td>
<td>1.2</td>
<td>0.595</td>
</tr>
</tbody>
</table>

**Figure 2.** Odds ratio with 95% confidence intervals of factors associated with undergoing cardiac catheterization during the hospitalization in 2,948 unstable angina patients in the GUARANTEE Registry. Factors associated with a higher likelihood of undergoing angiography appear to the right of the line of identity. After adjustment for the listed factors, fee-for-service patients were 25% more likely to undergo cardiac catheterization.

**Discussion**

There has been substantial growth in market share of managed care insurance in the U.S. health care market (2,15). Although this growth is probably associated with better control of rising health care costs, concern has been raised about whether quality of care can be preserved in the managed care environment (2,3,8,9). For patients admitted with acute coronary syndromes, there is substantial variation in process of care (12). This may be particularly true in patients with unstable angina, as there are fewer treatments available with proven efficacy (16–23). Recently published guidelines for the treatment of unstable angina have highlighted the use of aspirin, heparin, beta-blockers and invasive evaluation for appropriate patients (14). We evaluated whether or not the type of medical insurance was associated with the use of these medications and procedures.

**Overall findings.** In a cross-sectional evaluation of 1,404 FFS and 636 MC patients admitted to 35 U.S. hospitals with the admission diagnosis of unstable angina, we found modestly higher use rates of guideline-recommended medications in MC patients. At hospital discharge, MC patients were more likely to be discharged on aspirin or beta-blockers. Managed care patients were also more likely to be discharged on calcium...
channel blockers, the use of which is more controversial (24,25). Although there was little difference in the use of procedures during the hospitalization, this finding was confounded by the older age of the FFS patients. Thus, after multivariate adjustment, FFS patients were 25% more likely to undergo angiography than MC patients. This observed difference in angiography rates was probably not the result of underuse in MC patients, as there was no difference in the proportion of MC patients who underwent appropriate catheterization according to AHCPR guidelines. In this relatively small study with low overall mortality, there was no difference in hospital mortality.

On the whole, these findings support the concept that unstable angina patients with MC insurance received similar care to FFS patients. It appears that in situations where all patients are hospitalized, physicians do not treat patients differently based on insurance status. Although the process of care measures reported in this study (use of invasive cardiac procedures, as well as the use of guideline recommended medications) represent only a fraction of all factors that make-up quality of care, they do represent important process measures as they have been shown to be associated with mortality (16,18,19,21–23).

Managed care and resource utilization. There are two major mechanisms in which MC organizations can lower inpatient resource utilization. One is to decrease the rate of hospitalization for specific conditions. This mechanism represented the first strategy that was attempted by many MC organizations and has on the whole been duplicated by the FFS system (5,6). A second method for reducing resource utilization is to decrease the number of procedures and length-of-stay in hospitalized patients. Previous studies comparing process of care in health maintenance organization and fee-for-service systems have shown generally lower procedure utilization in health maintenance organizations. Langa and Sussman (26) found slightly higher coronary revascularization rates in fee-for-service versus health maintenance organization patients in California. Young and Cohen (27) showed higher angiography and bypass surgery rates, and similar coronary angioplasty rates in FFS systems in Massachusetts. Both of these studies were limited by the use of administrative database that may not have allowed for appropriate adjustments for baseline differences between the cohorts, as well as relatively older data (1988), that may not fully capture more recent cost containment policies enacted in the FFS system.

In a more recent study from the Myocardial Infarction Triage and Intervention (MITI) Registry, AMI patients admitted to a single staff model health maintenance organization had fewer procedures and similar hospital mortality in comparison with FFS patients (7). Compared with the present study, the single health maintenance organization in the MITI Registry may have had more administrative control of patient process of care with a free-standing hospital without on-site catheterization facilities. Although the present study may be more generalizable than previous studies, the fact that MC and FFS patients were admitted to the same hospitals may minimize any differences in process of care measures.

Study limitations. The present study, although consistent with previous reports, shows less dramatic differences in process of care measures between MC and FFS patients. This finding may be a reflection of the type of hospitals that participated in the GUARANTEE Registry, mostly tertiary medical centers. Previous studies have shown the strong association between the availability of on-site cardiac services and greater cardiac procedure utilization (28). Because the vast majority of hospitals that participated in the GUARANTEE Registry had on-site catheterization facilities, this factor could not be independently evaluated in this analysis. We also could not control for variation in admission criteria used by the different insurance plans. Differences in admission criteria could bias findings by including different patient groups with similar admission diagnoses. Another limitation of the study was the limited information collected about the type of insurance plans in the GUARANTEE Registry. Models of MC can range from staff-model HMOs with no economic incentives to perform procedures to contract pricing where economic incentives to perform procedures may still exist. Patients classified as having MC insurance status in this analysis, in all likelihood, represented a wide variety of MC models. These findings cannot be generalized to other conditions, particularly where hospitalization is not required for treatment. Finally with such a large number of hospitals in the Registry, we were unable to independently evaluate the interaction between individual hospitals and insurance type on process of care. Process of care measures attributed to MC insurance may have simply been a reflection of higher standards at a particular hospital independent of insurance type.

We conclude that in patients admitted with suspected unstable angina, MC patients are less likely to undergo coronary angiography, but are more likely to be discharged on guideline-recommended medications.

References