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Changes in Social Support within the Early Recovery Period and Outcomes After Acute Myocardial Infarction

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Abstract

Objective—To examine changes in social support during early recovery after acute myocardial infarction (AMI) and determine whether these changes influence outcomes within the first year.

Methods—Among 1951 AMI patients enrolled in a 19-center prospective study, we examined changes in social support between baseline (index hospitalization) and 1 month post-AMI to longitudinally assess their association with health status and depressive symptoms within the first year. We further examined whether 1-month support predicted outcomes independent of baseline support. Hierarchical repeated-measures regression evaluated associations, adjusting for site, baseline outcome level, baseline depressive symptoms, sociodemographic characteristics, and clinical factors.

Results—During the first month of recovery, 5.6% of patients had persistently low support, 6.4% had worsened support, 8.1% had improved support, and 80.0% had persistently high support. In risk-adjusted analyses, patients with worsened support (versus persistently high) had greater risk of angina (relative risk=1.46), lower disease-specific quality of life ($\beta=-7.44$), lower general mental functioning ($\beta=-4.82$), and more depressive symptoms ($\beta=1.94$) (all $p < 0.01$). Conversely, patients with improved support (versus persistently low) had better outcomes, including higher disease-specific quality of life ($\beta=6.78$), higher general mental functioning ($\beta=4.09$), and fewer

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COMPETING INTEREST STATEMENT

All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf and declare that Dr. Spertus owns the copyright to the Seattle Angina Questionnaire. There are no other competing interests to report.

depressive symptoms ($\beta=-1.48$) (all $p < 0.002$). In separate analyses, low support at 1 month was significantly associated with poorer outcomes, independent of baseline support level (all $p < 0.002$).

Conclusion—Changes in social support during early AMI recovery were not uncommon and were important for predicting outcomes. Intervening on low support during early recovery may provide a means of improving outcomes.

Keywords

depression; health status; myocardial infarction; prognosis; quality of life; social support

INTRODUCTION

Social support is an important predictor of outcomes after acute myocardial infarction (AMI) [1–4]. However, much of the research on this relationship has been limited to a single baseline assessment of support collected prior to hospital discharge. Such practice effectively treats social support as a stable trait and fails to consider evidence that perceptions or provision of support can change in accord with person-specific or situation-specific factors [5–8].

Currently, little is known about whether social support levels change during AMI recovery and how these changes may affect patient outcomes. From a methodological perspective, it is important to determine whether support levels at hospital presentation or those during early recovery have differing predictive value for outcomes. From a clinical perspective, demonstration of the predictive utility of support changes would suggest a potential opportunity to intervene on support during early recovery as a means of improving outcomes. Few studies have considered support levels at more than one time point [8–13], either among AMI-specific cohorts or other patient or community populations, and most have focused on mortality outcomes that have produced mixed results [9–13]. Less is known about the potential importance of social support changes for more patient-centered outcomes after AMI, such as health status and depressive symptoms.

In prior work, we reported an association between low levels of perceived social support measured at the time of the AMI hospitalization and poorer patient-centered outcomes within the first year [1]. In the present study, we expand upon these findings by including a measurement of support during early AMI recovery. We hypothesized that perceived support would fluctuate during early recovery from AMI among a subgroup of patients, with a decrease in support associated with poorer health status and an increase in support associated with better health status. To test this hypothesis, we utilized measurements of support from the index hospitalization and one month post-AMI to categorize patients according to level of perceived support and change in support during early recovery. We compared patients within these change categories on health status outcomes (angina symptoms, disease-specific quality of life, general mental and physical functioning) and depressive symptoms within the first year. We also examined whether support levels assessed during early recovery provide a unique contribution to the prediction of AMI outcomes independent of support levels assessed during the index hospitalization.

METHODS

Participants

Between January 2003 and June 2004, AMI patients hospitalized at 19 United States' centers were consecutively recruited as part of the Prospective Registry Evaluating Myocardial Infarction: Events and Recovery (PREMIER) study. The methods of PREMIER

have been described previously [14]. Briefly, eligible patients were age ≥ 18 years with increased troponin or creatine kinase-MB levels and additional evidence supporting AMI (>20 minutes of ischemic symptoms or electrocardiographic ST changes). Patients must have presented directly to the enrolling site or been transferred within the first 24 hours of presentation. Patients who were incarcerated, developed elevated cardiac enzymes because of elective coronary revascularization, or did not speak English or Spanish were not included. Of 2498 enrolled patients, 1951 were included in the present study after excluding those who died during their index hospitalization ($n = 17$) or had incomplete baseline or 1-month social support data ($n = 530$). Those excluded were more often non-white, unmarried, not working, and depressed; they were more likely to have cardiac-related comorbidities, more severe left-ventricular systolic dysfunction, and an AMI diagnosis other than ST-elevation MI, but they were less likely to have higher than a high school education or to have received coronary angiography during the index hospitalization.

Data collection

Baseline data were collected by medical chart abstraction and in-person patient interviews within 24 to 72 hours of hospital presentation. At the time of interview, patients were clinically stable and able to participate in the 30–35 minute interview; patients who were not stable at first contact were re-approached prior to discharge at a time when it was safe to conduct the interview. Follow-up interviews were conducted by telephone at 1, 6, and 12 months by a national follow-up center. Institutional Review Board approval was obtained at each participating institution, and patients provided informed consent for their study participation.

Social support assessment

Perceived social support was measured at the index hospitalization (baseline) and at 1 month post-discharge by 5 items from the Enhancing Recovery in Coronary Heart Disease (ENRICHD) Social Support Instrument (ESSI), a reliable and valid scale for cardiac populations [15]. The full-length ESSI comprises 7 items that prior studies have found individually predictive of mortality in cardiac patients [16–19]. The instrumental support and marital/partner status items were not used as part of the social support measure in our analyses as these items represent different domains of support and could differentially impact outcomes. The remaining 5 items querying the perceived availability of social support (Appendix) are measured on 5-point scales and summed to create a single score ranging from 5 to 25, with higher scores indicating greater perceived support. This 5-item scale has been used previously in cardiac populations [1, 15, 20–22], is highly correlated with the full-length 7-item scale [15], has itself been validated [15], and demonstrated strong internal consistency in our study sample at both baseline (Cronbach's $\alpha = 0.91$) and 1 month (Cronbach's $\alpha = 0.90$). Because the support score distribution exhibited substantial negative skew, we followed ENRICHD criteria for determining low support using the same 5 items from the ESSI [15]; we designated patients with a score of ≤ 3 on at least 2 items and a total score of ≤ 18 as having low perceived social support. Baseline and 1-month social support scores were only moderately correlated (Spearman's rank correlation coefficient = 0.354) and were used to further classify patients into 4 categories of support changes: persistently low (low support at baseline and low support at 1 month), worsened (high support at baseline and low support at 1 month), improved (low support at baseline and high support at 1 month), and persistently high (high support at baseline and high support at 1 month). Sensitivity analyses were performed by varying the cutpoint for low support, with similar results obtained.

Outcome measurement

Patient outcomes were measured at baseline, 1, 6, and 12 months. The Seattle Angina Questionnaire (SAQ) Angina Frequency (AF) and Quality of Life (QoL) subscales quantified disease-specific health status [23]. These scales have demonstrated validity, reliability, and clinical responsiveness in cardiac populations [23, 24] and are predictive of subsequent mortality, rehospitalization, and costs [25–27]. Scores for both subscales range from 0 to 100, with higher scores indicating better health status (less angina burden, better quality of life). Given the large percentage of patients reporting no angina symptoms at 12 months, and in accordance with previous studies [24, 28–30], SAQ AF scores were dichotomized into any angina (score <100) versus no angina (score = 100).

The SF-12 Physical Component Summary (PCS) and Mental Component Summary (MCS) subscales provided reliable and valid generic health status measures quantifying patients' general physical and mental functional status [31]. A score of 50 represents the United States' population mean, with a 10-point change representing 1 standard deviation.

The 9-item Patient Health Questionnaire (PHQ-9) quantified depressive symptoms [32]. With suitable cutpoints, this valid and reliable scale can identify both major depression and sub-threshold depressive disorder [32, 33]. Scores range from 0 to 27, with higher scores indicating greater depressive symptomatology, and a score of 10 or higher indicative of at least moderately severe depressive symptoms.

Statistical analysis

The persistently low, worsened, improved, and persistently high social support groups were compared on baseline sociodemographic and clinical characteristics, as well as baseline, 1-month, 6-month, and 12-month health status and depressive symptoms. Pearson chi-square tests compared categorical variables, and analysis of variance compared continuous variables.

Hierarchical repeated-measures regression evaluated the relationships between social support change status and AMI outcomes within the first year of recovery. For each of the 5 outcomes evaluated, only patients with data for the outcome at baseline and at least 1 follow-up assessment at either 6 or 12 months were included in the analytic model. Therefore, of the 1951 patients eligible for study inclusion, 1817 (93%) were included in analyses for SAQ AF, 1783 (91%) for SAQ QoL, 1713 (88%) for SF-12 PCS and MCS, and 1693 (87%) for PHQ-9. Linear mixed-effects models were developed for the continuous, approximately normally-distributed outcomes (SAQ QoL, SF-12 PCS, SF-12 MCS, PHQ-9). For SAQ AF, a dichotomous outcome that was not rare in our study (>20% of patients reported angina symptoms), relative risks were calculated directly using modified Poisson mixed-effects models [34].

To assess the predictive value of transitions between low and high levels of social support within the early recovery period (baseline to 1 month) for each of the outcomes, multivariable models compared patients with worsened support to patients with persistently high support and patients with improved support to patients with persistently low support. Secondary analyses compared patients with worsened support to patients with persistently low support and patients with improved support to patients with persistently high support. To examine the independent effect of 1-month social support, net of baseline support, 3 models were developed for each of the outcomes. The first model included only baseline support, the second only 1-month support, and the third both baseline support and 1-month support.

All models incorporated repeated measurements for the outcome of interest over time (6 and 12 months) and included the corresponding baseline measurement of the outcome as a covariate. Models included a random effect for site to account for patient clustering by hospital and adjusted for the fixed effects of the sociodemographic and clinical characteristics detailed in Table 1. Given the generally strong association reported between social support and depression [1, 35–37], models for SAQ AF, SAQ QOL, SF-12 PCS, and SF-12 MCS also adjusted for baseline depressive symptoms. A support-by-time interaction term was included to assess variation in the relationship between social support and outcomes over time. As all interactions were nonsignificant at the $p = 0.10$ level, models represent the association of social support with each of the outcomes during the follow-up period, averaged across both follow-up points (6 and 12 months). Because the 5 outcomes were specified *a priori* and represent different domains of patient-centered outcomes, no adjustment was made for multiple comparisons. All analyses were performed using SAS version 9.2 (SAS Institute Inc., Cary, North Carolina), with 2-tailed tests for statistical significance and $\alpha = 0.05$.

RESULTS

Patient characteristics

Of the 1951 patients included in our study, approximately 14% reported low social support at baseline and 12% reported low social support at 1 month. Using data from both time points, 5.6% of patients had persistently low support, 6.4% worsened support, 8.1% improved support, and 80.0% persistently high support. Patients within these support change categories differed significantly on baseline characteristics (Table 1). Patients with persistently low, worsened, or improved support were less likely to be married or working. Patients with persistently low or worsened support were more likely to have a history of AMI or percutaneous coronary intervention and less likely to receive coronary angiography during hospitalization. Patients with persistently low support were much more likely to lack insurance and more likely to have smoked within the past year. Those with worsened support were more likely to have a history of stroke.

During the 12 months of AMI recovery, health status and depressive symptoms generally improved for all categories of social support (Table 2). Across time points, patients with persistently high support experienced the best outcomes (lower frequency of angina, higher disease-specific quality of life and general physical and mental functioning, fewer depressive symptoms). For 3 outcomes (SAQ AF, SAQ QoL, and SF-12 MCS), patients with persistently low or worsened support exhibited similar scores, while patients with improved support exhibited scores numerically closer to those patients with persistently high support. For SF-12 PCS, patients with persistently low, worsened, or improved support exhibited similar scores that were only slightly worse than those of the persistently high support group. Baseline PHQ-9 scores were also similar for those with persistently low, worsened, or improved support and were worse than those for the persistently high support group. However, by 1 month, a trend emerged across support categories: patients with persistently high support had the least depressive symptoms, followed by those with improved, worsened, and persistently low support, respectively.

Risk-adjusted associations

In risk-adjusted models comparing the 4 categories of social support changes, patients with worsened support had a greater risk of having angina (defined by SAQ AF), lower mean SAQ QoL and SF-12 MCS scores, and higher mean PHQ-9 scores than their persistently high support counterparts (Table 3). Patients with improved support had higher mean SAQ QoL and SF-12 MCS scores, lower mean PHQ-9 scores, and a marginally reduced risk of

having angina ($p = 0.086$) than patients with persistently low support. In secondary analyses, patients with worsened support had no significant differences in outcomes from those with persistently low support, and patients with improved support had no differences from those with persistently high support, except they showed slightly higher mean PHQ-9 scores. No significant differences among support groups were observed for SF-12 PCS scores.

In separate risk-adjusted models, low baseline social support and low 1-month social support were each associated with lower mean SAQ QoL, lower mean SF-12 MCS, and higher mean PHQ-9 scores over the first year of recovery. Models of SAQ AF showed low 1-month support was also significantly associated with greater risk of angina, while low baseline support bordered significance. The association between social support and each of these 4 outcomes appeared stronger for models examining 1-month support than for models examining baseline support. Neither low support at baseline nor low support at 1 month was associated with mean SF-12 PCS scores. When risk-adjusted models simultaneously included baseline and 1-month social support, low support at 1 month but not at baseline was associated with a greater risk of angina and lower mean SAQ QoL scores (Table 4). Both baseline and 1-month low support were associated with lower mean SF-12 MCS scores and higher mean PHQ-9 scores, although low 1-month support was a stronger predictor than low baseline support.

DISCUSSION

This prospective study of patients recovering from AMI found that approximately 1 in 7 patients experienced early changes in social support and suggests these changes may be important when predicting outcomes later in the recovery process. In our study, patients with worsening levels of support had poorer outcomes than those with continued high support while patients with improving support had better outcomes than those with continued low support. A strong relationship was observed between low support assessed at 1 month and longitudinal outcomes that was independent of the relationship with baseline support. For the outcomes of angina and disease-specific quality of life, this addition of 1-month support completely attenuated the relationship of the outcomes with baseline support.

In a prior study of the PREMIER cohort, we found that AMI patients with the lowest (compared to the highest) support at the index hospitalization had worse health status and more depressive symptoms over the first year of recovery [1]. We expand upon these findings in the present study by identifying subgroups of patients who experienced changes in their perceived social support during the first month. Although support levels remained stable for a high proportion of AMI patients in our study, 6.4% of patients reported worsened support and 8.1% reported improved support. Such changes were not unexpected given prior research suggesting the amount, perceptions, and utilization of support can be affected by person-specific or situation-specific factors [5–8]. As a traumatic and life-altering event, the occurrence of AMI itself or the hospitalization could alter perceptions of social support. For instance, during the crisis of the hospitalization it may be difficult for patients to assess their levels of support, or during recovery, support may take on a different meaning. The recovery period from AMI may also influence patients' support needs, availability, or quality, all of which could alter their perceptions of support.

Few studies have examined the prognostic importance of changes in support during AMI recovery, and these studies have primarily focused on mortality. In two positive studies, decline in structural support over time was associated with increased mortality in risk-adjusted analyses; however, these associations were limited to men age 65 years in one of the studies and women age 70–74 in the other [9, 10]. Two other studies, one examining

structural support and one functional support, did not find a significant risk-adjusted relationship between support changes and mortality [11, 12].

Non-mortality outcomes such as health status and depressive symptoms have been less commonly reported in the literature. ENRICH found that cognitive-behavioral therapy to decrease depression and increase social support among AMI patients led to improved quality of life at 6 months compared to usual medical care, although the benefits were small and confined to mental health status [21]. Consistent with their findings, we observed an association between changes in support and general mental functioning but not general physical functioning. We further describe the importance of social support changes for predicting other patient-centered outcomes, including angina, disease-specific quality of life, and depressive symptoms. We also demonstrate a relationship between 1-month support and outcomes that is independent of baseline support. This focus on patient-centered outcomes is particularly important, as moderate changes in support over a short period of time may be insufficient to affect major medical outcomes such as mortality, but may be important for health status and depressive symptoms.

Our study identified dynamic changes in support for a subset of AMI patients during the early recovery period. The results suggest that it may be more important where patients' support levels end up during the early recovery period after hospital discharge than where they began during the index hospitalization. Interventions implemented soon after the AMI to improve social support, or at least prevent it from worsening, may represent an important opportunity to improve outcomes. From a clinical perspective, our results indicate a potential value in assessing support early after discharge and may provide a means to better target populations that might benefit from support interventions. Our findings could also help guide the design of future studies where measurement of support is of interest. In instances where a baseline assessment of support is not feasible, an assessment after hospital discharge during the early recovery period may be appropriate since 1-month support is as strong, if not stronger, of a predictor on outcomes as an assessment of support at baseline. Moreover, assessments at 1 month are able to take into account any readjustments or reevaluations of support that may occur following AMI.

Several limitations should be considered when interpreting these results. First, we examined only perceived social support. Other forms of support (e.g., structural aspects, received support), could also be important for outcomes [4, 45]. Second, both social support and outcomes were measured by self-report. Although self-report is the most appropriate means to accurately assess these patient-centered variables, we cannot exclude the possibility of shared method variance impacting results, with some unmeasured variable (e.g., neuroticism) potentially influencing ratings across the measurements. Third, it is possible we observed a stronger association of outcomes with 1-month support than with baseline support simply because the 1-month scores are temporally closer to the outcomes. However, we were able to observe an independent association of changes in support from baseline to 1 month with outcomes. Fourth, as with any observational study, we cannot definitively establish causality for the associations explored. Reverse causality is possible in that change in health status and/or depressive symptoms could influence perceptions of support. However, our longitudinal analyses with baseline and 1-month support predicting health status and depressive symptoms at 6 months to 1 year after AMI (while adjusting for baseline levels of the outcome) greatly reduce the possible impact on our results and interpretation. Residual confounding, due either to unmeasured or inadequately measured control variables, is also possible. Finally, results from this multi-site study, which included a variety of institution types and geographic locations across the United States, may not generalize to AMI patients seen at other institutions or AMI patients who do not speak English or Spanish.

In summary, subgroups of AMI patients experienced changes in social support during the early recovery period. For those patients with decreased levels of support, outcome prognosis was worse than that of patients who had continually high support; for those with increased levels, outcome prognosis was better than that of patients who had continually low support. Measurement of support during early recovery, in addition to measurement at the index hospitalization, may improve the predictive value of support for AMI outcomes in the future. Moreover, the importance of differences in support during this early period suggests a potential opportunity for intervention to improve patient-centered outcomes. Further research is needed to corroborate our findings, identify factors that contribute to changes in support, examine whether support continues to change throughout the entire recovery process, and determine the feasibility and most effective means of intervening on support.

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APPENDIX

5-Item Social Support Scale

The following questions ask about other people who provide you with assistance and support.

	None of the Time	A little of the time	Some of the time	Most of the time	All of the time
Is there someone available to you whom you can count on to listen to you when you need to talk?	☐	☐	☐	☐	☐
Is there someone available to you to give you good advice about a problem?	☐	☐	☐	☐	☐
Is there someone available to you who shows you love and affection?	☐	☐	☐	☐	☐
Can you count on anyone to provide you with emotional support (talking over problems or helping you make a difficult decision)?	☐	☐	☐	☐	☐
Do you have as much contact as you would like with someone you feel close to, someone in whom you can trust and confide?	☐	☐	☐	☐	☐

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Table 1

Baseline Patient Characteristics According to Social Support Status at 1 Month^a

	Social Support Status				<i>p</i>
	Persistently Low (<i>n</i> = 109; 5.6%)	Worsened (<i>n</i> = 124; 6.4%)	Improved (<i>n</i> = 158; 8.1%)	Persistently High (<i>n</i> = 1560; 80.0%)	
Sociodemographics					
Age, y, mean (SD)	57.5 (13.0)	60.8 (12.4)	61.4 (11.6)	60.7 (12.9)	.07
Female	33.0	35.5	32.9	31.5	.81
Caucasian ^{<i>b</i>}	71.3	75.8	77.9	77.8	.45
Married ^{<i>b</i>}	22.9	55.5	51.6	67.9	<.001
Working full- or part-time ^{<i>b</i>}	39.5	38.2	39.7	47.7	.03
>high school education ^{<i>b</i>}	52.3	55.3	50.7	49.8	.68
No health insurance/self-pay ^{<i>b</i>}	21.9	13.2	13.0	11.7	.02
Medical History					
Prior MI	28.4	25.0	14.6	19.6	.02
Prior PCI	22.0	26.6	13.3	18.3	.03
Prior CABG	13.8	19.4	8.9	12.6	.07
Congestive heart failure	11.0	11.3	10.1	9.4	.86
Hypertension	59.6	64.5	65.8	61.7	.65
Diabetes	24.8	32.3	29.1	26.2	.41
Hypercholesterolemia	56.0	52.4	50.0	49.2	.52
Chronic lung disease	14.7	14.5	12.7	11.0	.44
Chronic renal failure	8.3	13.7	10.1	7.4	.06
Prior stroke/TIA	8.3	14.5	10.8	7.0	.01
Smoked within past year ^{<i>b</i>}	61.5	37.4	38.0	34.5	<.001
Clinical Presentation					
LVSD: moderate/severe ^{<i>b</i>}	23.9	25.0	24.1	24.8	.99
Final MI diagnosis: STEMI	41.3	41.9	45.6	46.5	.59
Hospital Care					
Coronary angiography	84.4	80.7	87.3	90.7	.009

Social Support Status				
	Persistently Low (<i>n</i> = 109; 5.6%)	Worsened (<i>n</i> = 124; 6.4%)	Improved (<i>n</i> = 158; 8.1%)	Persistently High (<i>n</i> = 1560; 80.0%)
QOC indicators: # eligible, mean (SD)	5.2 (1.3)	5.0 (1.3)	5.1 (1.3)	5.2 (1.3)
QOC indicators: % received, mean (SD)	86.8 (17.6)	87.6 (15.8)	90.4 (14.7)	88.0 (17.2)
				<i>p</i>
				.46
				.31

Abbreviations: CABG, coronary artery bypass grafting; LVSD, left ventricular systolic dysfunction; MI, myocardial infarction; PCI, percutaneous coronary intervention; QOC, quality of care; SBP, systolic blood pressure; SD, standard deviation; STEMI, ST-segment elevation MI; TIA, transient ischemic attack.

^aData are presented as column-wise percentages unless otherwise specified.

^bMissing data present: <1% for Caucasian, married, working full- or part-time, smoked within past year, LVSD; 1%–3% for >high school education, acute SBP, acute heart rate; 5% for no health insurance/self-pay.

Table 2

Patient Outcomes According to Social Support Status at 1 Month

Outcome	Social Support Status				p
	Persistently Low	Worsened	Improved	Persistently High	
SAQ AF score <100, %					
Baseline	n = 98	n = 111	n = 142	n = 1466	
1 month	63.3	62.9	54.4	51.9	.02
6 months	45.5	42.3	27.9	24.9	<.001
12 months	43.3	34.0	26.8	21.6	<.001
SAQ QoL, mean (SD)					
Baseline	n = 93	n = 108	n = 141	n = 1441	
1 month	53.6 (30.2)	58.9 (25.5)	62.8 (23.2)	64.1 (22.5)	<.001
6 months	64.6 (29.2)	68.7 (25.2)	75.5 (23.9)	78.5 (20.8)	<.001
12 months	70.7 (26.8)	75.3 (22.8)	80.3 (21.7)	84.7 (17.6)	<.001
SF-12 PCS, mean (SD)					
Baseline	n = 91	n = 101	n = 140	n = 1381	
1 month	40.7 (13.8)	41.6 (14.0)	42.2 (12.4)	44.0 (12.1)	.007
6 months	37.2 (11.6)	35.8 (12.4)	37.9 (12.3)	39.6 (11.2)	<.001
12 months	42.5 (10.4)	43.1 (11.3)	42.7 (11.7)	44.8 (12.0)	.049
SF-12 MCS, mean (SD)					
Baseline	n = 91	n = 101	n = 140	n = 1381	
1 month	42.1 (12.8)	42.9 (12.9)	43.3 (12.4)	45.4 (11.3)	.006
6 months					
12 months					
PHQ-9 Depression, mean (SD)					
Baseline	n = 86	n = 99	n = 133	n = 1375	
1 month	9.7 (7.2)	7.6 (5.6)	8.3 (5.4)	4.8 (5.0)	<.001
6 months	8.8 (6.8)	8.2 (6.0)	5.4 (4.3)	3.8 (4.1)	<.001
12 months	7.7 (6.6)	6.3 (5.9)	4.8 (4.9)	3.0 (3.9)	<.001
	6.2 (5.4)	5.7 (6.1)	4.6 (4.8)	2.5 (3.7)	<.001

Abbreviations: AF, Angina Frequency; MCS, Mental Component Summary; PCS, Physical Component Summary; PHQ, Patient Health Questionnaire; QoL, Quality of Life; SAQ, Seattle Angina Questionnaire; SD, standard deviation; SF, Short Form.

Table 3

Risk-Adjusted Models for the Association of Changes in Social Support with Outcomes

Social Support Comparison	SAQ AF Model ^a <i>n</i> = 1817 RR (95% CI)	SAQ QoL Model ^a <i>n</i> = 1783 β (95% CI)	SF-12 PCS Model ^a <i>n</i> = 1713 β (95% CI)	SF-12 MCS Model ^a <i>n</i> = 1713 β (95% CI)	PHQ-9 Model ^b <i>n</i> = 1693 β (95% CI)
Primary Comparisons					
Worsened vs. persistently high	1.46 (1.08, 1.97)	-7.44 (-10.54, -4.34)	-0.20 (-2.14, 1.73)	-4.82 (-6.42, -3.22)	1.94 (1.22, 2.66)
Improved vs. persistently low	0.81 (0.63, 1.03)	6.78 (2.80, 10.76)	-0.30 (-2.74, 2.15)	4.09 (2.06, 6.12)	-1.48 (-2.41, -0.55)
Secondary Comparisons					
Worsened vs. persistently low	1.04 (0.78, 1.40)	0.19 (-4.13, 4.50)	-0.06 (-2.74, 2.62)	0.81 (-1.41, 3.03)	-0.34 (-1.35, 0.66)
Improved vs. persistently high	1.13 (0.89, 1.43)	-0.85 (-3.49, 1.80)	-0.44 (-2.07, 1.18)	-1.54 (-2.88, -0.20)	0.81 (0.19, 1.43)

Abbreviations: AF, Atrial Fibrillation; QoL, quality of life; CI, confidence interval; MCS, Mental Component Summary; PCS, Physical Component Summary; PHQ, Patient Health Questionnaire; QoL, Quality of Life; RR, relative risk; SAQ, Seattle Angina Questionnaire; SF, Short Form.

^a Accounting for site (using a random effect) and repeated outcome measures over time (6 and 12 months). Risk-adjusted for baseline health status (SAQ AF, SAQ QoL, SF-12 PCS, or SF-12 MCS), baseline depressive symptoms, age, sex, race, marital status, education, primary insurance, smoking status, prior coronary artery disease, hypertension, hypercholesterolemia, prior stroke/transient ischemic attack, congestive heart failure, chronic renal failure, chronic lung disease, left ventricular systolic dysfunction, final myocardial infarction diagnosis, coronary angiography during index hospitalization, and number of quality of care indicators eligible for during index hospitalization and percent of those received.

^b Adjusted for all of the above, except baseline health status.

Risk-Adjusted Models Examining the Predictive Value for Outcomes of 1-Month Social Support after Accounting for Baseline Social Support

Table 4

	Baseline Support Entered Separately			1-Month Support Entered Separately			Baseline and 1-Month Support Entered Simultaneously		
	Estimate (95% CI)	t	p	Estimate (95% CI)	t	p	Estimate (95% CI)	t	p
SAQ AF Model, RR (n = 1817)^a									
Low baseline support	1.18 (0.98, 1.43)	1.70	.09				1.06 (0.89, 1.27)	0.70	.49
Low 1-month support				1.40 (1.14, 1.73)	3.15	.002	1.37 (1.12, 1.68)	3.06	.002
SAQ QOL Model, β (n = 1783)^a									
Low baseline support	-2.65 (-4.85, -0.45)	-2.37	.02				-0.67 (-2.95, 1.61)	-0.58	.56
Low 1-month support				-7.41 (-9.75, -5.06)	-6.19	<.001	-7.19 (-9.65, -4.73)	-5.74	<.001
SF-12 PCS Model, β (n = 1713)^a									
Low baseline support	-0.31 (-1.65, 1.03)	-0.46	.65				-0.31 (-1.71, 1.09)	-0.43	.67
Low 1-month support				-0.11 (-1.56, 1.34)	-0.15	.88	-0.01 (-1.53, 1.51)	-0.02	.99
SF-12 MCS Model, β (n = 1713)^a									
Low baseline support	-2.57 (-3.70, -1.44)	-4.47	<.001				-1.35 (-2.50, -0.19)	-2.28	.02
Low 1-month support				-4.97 (-6.18, -3.76)	-8.07	<.001	-4.54 (-5.80, -3.28)	-7.05	<.001
PHQ-9 Mode, β (n = 1693)^b									
Low baseline support	1.18 (0.66, 1.69)	4.49	<.001				0.68 (0.15, 1.21)	2.51	.01
Low 1-month support				1.99 (1.44, 2.54)	7.13	<.001	1.77 (1.19, 2.34)	6.05	<.001

Abbreviations: CI, confidence interval; RR, relative risk; SAQ, Seattle Angina Questionnaire; AF, Angina Frequency; QoL, Quality of Life; SF, Short Form; PCS, Physical Component Summary; MCS, Mental Component Summary; PHQ, Patient Health Questionnaire.

^a Accounting for site (using a random effect) and repeated outcome measures over time (6 and 12 months). Risk-adjusted for baseline health status (SAQ AF, SAQ QoL, SF-12 PCS, or SF-12 MCS), baseline depressive symptoms, age, sex, race, marital status, education, primary insurance, smoking status, prior coronary artery disease, hypertension, hypercholesterolemia, prior stroke/transient ischemic attack, congestive heart failure, chronic renal failure, chronic lung disease, left ventricular systolic dysfunction, final myocardial infarction diagnosis, coronary angiography during index hospitalization, and number of quality of care indicators eligible for during index hospitalization and percent of those received.

^b Models adjusted for all of the above, except baseline health status.