

# Is patient involvement during hospitalization for acute myocardial infarction associated with post-discharge treatment outcome?

## An exploratory study

Judith E. Arnetz PhD MPT PT,\* Ulrika Winblad PhD,† Anna T. Höglund ThD,‡ Bertil Lindahl MD PhD,§ Kalle Spångberg PhD,¶ Lars Wallentin MD PhD,\*\* Yun Wang MAS,†† Joel Ager PhD‡‡ and Bengt B. Arnetz MD PhD§§

\*Associate professor, Department of Family Medicine and Public Health Sciences, Wayne State University, Detroit, MI, USA and Department of Public Health and Caring Sciences, Uppsala University, Uppsala, Sweden, †Senior researcher, Department of Public Health and Caring Sciences, ‡Associate professor, Department of Public Health and Caring Sciences, Uppsala University, Uppsala, Sweden, §Associate professor and Director, Uppsala Clinical Research Centre, ¶Data manager, Uppsala Clinical Research Centre, \*\*Professor and Assistant director, Uppsala Clinical Research Centre, Uppsala University Hospital, Uppsala, Sweden, ††Research assistant, Department of Family Medicine and Public Health Sciences, ‡‡Professor, Department of Family Medicine and Public Health Sciences, Division of Epidemiology and Biostatistics, Wayne State University, Detroit, MI, USA and §§Professor, Department of Family Medicine and Public Health Sciences, Wayne State University, Detroit, MI, USA and Department of Public Health and Caring Sciences, Uppsala University, Uppsala, Sweden

### Abstract

#### Correspondence

Judith E. Arnetz PhD, MPH, PT  
Department of Family Medicine and  
Public Health Sciences  
Division of Occupational and  
Environmental Health  
Wayne State University  
3800 Woodward Ave  
Detroit  
MI  
USA  
E-mail: jarnetz@med.wayne.edu

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**Keywords:** cardiology, myocardial infarction, patient involvement, patient perceptions, questionnaire

**Objective** To investigate whether patient involvement during hospitalization for acute myocardial infarction (MI) was associated with health and behavioural outcomes 6–10 weeks after hospital discharge.

**Background** Patient involvement has been associated with improved health outcomes in chronic disease, but less research has focused on the effects of patient involvement in acute conditions, such as MI.

**Design** Self-administered questionnaire study. Questionnaire results were run against medical outcome data in a national database of cardiac patients.

**Setting and participants** Cardiac patients ( $n = 591$ ) on their first follow-up visit after hospitalization for MI at 11 Swedish hospitals.

**Main outcome measures** Patient ratings of three questionnaire scales related to involvement; cardiovascular symptoms, medication compliance, participation in cardiac rehabilitation, and achievement of secondary preventive goals.

**Results** More positive patient ratings of involvement were significantly associated with fewer cardiovascular symptoms 6–10 weeks after hospital discharge. In contrast, patients who attended cardiac rehabilitation and achieved the goals for smoking cessation and systolic blood pressure were significantly less satisfied with their

involvement. No association was found between involvement ratings and medication compliance.

**Conclusion** This study represents a first attempt to examine associations between patient involvement in the acute phase of illness and short-term health outcomes. Some significant associations between involvement and health and behavioural outcomes after acute MI were found. However, higher involvement ratings were not consistently associated with more desirable outcomes, and involvement during hospitalization was not associated with MI patient health and behaviour 6–10 weeks after hospital discharge to the extent hypothesized.

## Introduction

Over the past decade, a growing body of research has focused on the importance of patient involvement in health care decision making<sup>1–3</sup> and illness self-management.<sup>4</sup> The theoretical foundation for this research is that effective patient participation in medical care will improve treatment outcomes and control of chronic disease.<sup>5</sup> For example, patient involvement has been associated with improved metabolic control in diabetes,<sup>5–7</sup> physical function<sup>8</sup> and decreased organ damage<sup>9</sup> in rheumatic disease, and medication adherence in patients with depression.<sup>10</sup> In cancer patients, active participation in medical consultations has been associated with reduced anxiety.<sup>11</sup> However, the majority of studies linking patient involvement with health outcomes have been conducted in outpatient settings.<sup>12–14</sup> Less is known about the effects of patient involvement on the outcomes of acute illness requiring hospitalization, such as myocardial infarction (MI).

An acute MI is potentially life-threatening and it is generally accepted that appropriate medical care is necessary as soon as possible after the onset of symptoms.<sup>15</sup> From a medical standpoint, the situation leaves little time for lengthy discussion with the patient.<sup>16</sup> However, previous studies indicate that patients' initial perceptions<sup>17,18</sup> and understanding<sup>19,20</sup> of their MI may also be important determinants of recovery and motivation for continued self-management of their illness. Moreover, the MI patient's initial hospitalization experience<sup>19–21</sup>

and sense of control<sup>22</sup> may have a direct impact on their subsequent adoption of lifestyle changes and interest in secondary prevention to prevent further illness. The time immediately following hospital discharge is especially crucial, as the risk of death is highest in the first 30 days after MI.<sup>15</sup>

As patient-centred care is increasingly encouraged and even regulated by healthcare legislation,<sup>23,24</sup> it is important to study the effects of involvement on care processes, perceived quality of care and health outcomes. Covinsky *et al.*<sup>25</sup> reported that MI patients' reported problems with communication and health education discussions during hospitalization were related to health status and return to work 3 months post-MI. While patient involvement is related to patient-provider communication,<sup>26</sup> no previous study to our knowledge has looked specifically at the impact of patient involvement during hospitalization on MI outcomes.

A recently presented conceptual model of patient involvement in MI care suggests that active patient involvement in treatment discussions and care processes during hospitalization is a necessary factor in optimizing treatment outcomes.<sup>27</sup> Involvement may result in improved self-efficacy through a better understanding of one's condition, which in turn may lead to increased motivation to take responsibility for one's health and better self-care skills.<sup>28</sup> Theoretically, outcomes would be improved by, for example, medication compliance and active secondary prevention. To date, however, there has been a lack of data to examine the validity of

this hypothesis. In this study, questionnaire data regarding MI patients' views of their involvement during hospitalization were run against medical outcome data in a national database of cardiac patients.

The aim of this study was to investigate whether MI patients' questionnaire ratings of their involvement were associated with cardiovascular symptoms, medication compliance, participation in cardiac rehabilitation and achievement of secondary prevention goals<sup>29</sup> at the time of the first follow-up visit after hospital discharge. The hypothesis was that higher patient ratings of involvement during hospitalization would be associated with fewer coronary symptoms, better medication compliance and greater participation in cardiac rehabilitation programmes 6–10 weeks after hospital discharge. It was also hypothesized that patients with higher involvement ratings would achieve treatment goals for smoking cessation, blood pressure, cholesterol, physical activity, angiotensin-converting enzyme (ACE) inhibitors and return to work to a significantly greater extent than patients with lower involvement ratings.

## Methods

A self-report questionnaire survey was distributed to MI patients included in the register for Secondary Prevention after Heart Intensive Care Admissions (SEPHIA) in Sweden. SEPHIA is part of the Register of Information and Knowledge about Swedish Heart Intensive Care Admissions (RIKS-HIA), a national database with treatment data for 95% of Sweden's coronary heart disease patients. The SEPHIA register contains only data on cardiac patients under the age of 75. MI patients treated at SEPHIA hospitals are followed-up on two occasions after hospital discharge. The first follow-up is at 6–10 weeks and the second is 12 months post-discharge. The patient questionnaire was an addition to existing SEPHIA routines for the initial patient follow-up. This study design made it possible to explore possible associations between patient-rated involvement during hospitalization and health outcomes, both

subjective and objective, measured at each follow-up. This study focused on outcomes at the first follow-up.

## Setting and participants

The study was carried out over a 1-year period (2005–06) among SEPHIA cardiology departments. Letters of invitation to participate in the study were sent to all SEPHIA hospitals in March 2005. Of the 32 hospitals included in the SEPHIA register at that time, 11 agreed to participate in the patient involvement study. Those cardiology departments declining participation did so due to reported lack of time and/or resources. Study participants were MI patients under the age of 75 in participating cardiology departments.

## Data collection

Data collection began in September 2005 and continued through August 2006. Each of the 11 participating departments received 100 questionnaires to distribute to all consecutive MI patients under the age of 75 and eligible for inclusion in the SEPHIA register. Each hospital received 100 questionnaires as that was considered the maximum number of MI patients fulfilling the study criteria to be expected at any one hospital. Questionnaires were distributed to all eligible patients by department staff in conjunction with the patient's first follow-up visit after hospitalization, 6–10 weeks post-discharge. During these visits, department staff interviewed patients and registered health status data in the SEPHIA register. Questionnaires were accompanied by a cover letter from the research team with information about the study. The letter explained that participation was voluntary, and that questionnaire results would be analysed with medical data in the SEPHIA register. Each patient also received a postage-paid return envelope for mailing the completed questionnaire to the research team. Each department received a list of 100 code numbers. Department staff assigned a code number to each patient's questionnaire before it was distributed. It was

explained to patients that the code number would enable the cross-analysis of questionnaire data with health outcome data in the SEPHIA database. Lists matching code numbers to specific patients were sent by the departments directly to the SEPHIA database statisticians and were at no time seen by the research team.

Patients were encouraged to fill out the questionnaire at the conclusion of their visit, but could take the questionnaire home if they preferred. No reminder letters were sent. Participating cardiology departments differed in size and number of MI patients and only four of the 11 departments distributed all or nearly all of their 100 questionnaires. Three departments distributed between 60 and 80 questionnaires, three distributed approximately 50, and one department distributed only 11 questionnaires. A total of 782 questionnaires were distributed to patients during the 12-month study period. Of these, 652 were returned, resulting in an overall response rate of 83%. However, when merging the questionnaire data set with the SEPHIA register, 61 cases were eliminated. Forty-four of these 61 cases were patients who had been treated at a hospital that did not participate in the questionnaire study, but had received the questionnaire because their follow-up visit was

carried out at a different (participating) hospital. The remaining 17 cases either lacked an identification code or had codes that appeared in the data set more than once. Thus, the final sample for this study was 591 patients, representing 76% of the total number of questionnaire respondents.

### Questionnaire

The questionnaire, developed for this study, consisted of 53 forced-choice items and was based on results of focus group discussions with MI patients. Psychometric analysis of the questionnaire revealed good validity and internal reliability.<sup>30</sup> The questionnaire comprises six scales measuring various aspects of the patient's views and/or behaviour regarding their involvement in discussions and decisions during hospital treatment of their MI. All scale items ask the patient to rate a specific statement on a four-point Likert-type scale, ranging from 1 ('no, not at all') to 4 ('yes, to a great degree').<sup>30</sup> This study focused on three of the six scales: information, patient needs and treatment planning. An overview of the three scales with their component items and corresponding measures of internal homogeneity is presented in Table 1.

**Table 1** Description of patient involvement scales, reliability estimates (Cronbach's alphas), mean and median percentage scores (standard deviation = SD) for all respondents ( $n = 591$ )

Scale and items (number of items, Cronbach's alpha)	Mean, median % score (SD)
Information (5, 0.87) Did you receive the information you wanted about the following: your illness/condition and its course; why specific examinations/treatments were done; how examinations/treatments are carried out; possible pain/discomfort that can develop in conjunction with examinations/treatments; what occurred during the acute phase.	84.9, 93.3 (18.0)
Patient needs (7, 0.81) Did you have the opportunity to ask questions about your condition/illness; Did you understand the information you received; Were doctors and nurses sensitive to your needs/requests; were you treated with respect; Did you receive the information you wanted about results of examinations/treatments? Did you receive the information you wanted about your medications? Did you have the opportunity to ask questions when you were being discharged?	87.7, 90.5 (14.1)
Treatment planning (4, 0.76) Did you take part in discussing your examinations/treatments? Did you discuss the goals of your treatment with your doctor? Have doctors/nurses motivated you to take responsibility for your future health? Did you take part in planning your follow-up care, i.e., what would happen after you left the hospital?	62.6, 66.7 (23.9)

The analysis was limited to three scales for a number of reasons. First, limiting the number of scales would reduce the number of statistical tests. Second, the three omitted scales measured patients' definition of involvement; their illness experience at the time the MI occurred; and involvement in discussing do's and don'ts regarding specific activities after discharge. These scales did not capture aspects of involvement during the hospitalization process as well as those selected. The scales selected for analysis measure aspects of hospital care in which the patient was either passively involved, such as receiving information, or actively involved in discussions and treatment planning. They were selected because they reflect key aspects of the MI patient's in-hospital involvement experience that were theorized to be most relevant to patient secondary preventive behaviour post-discharge. The information scale concerns the degree to which the patient received the information and explanations he wanted regarding his condition and its course and treatment during hospitalization. This scale was included because, in the case of acute MI, it was hypothesized that an understanding of one's condition, including what occurred during the emergency phase, reasons for conducting specific treatments and examinations, and possible pain or discomfort that might be expected, was an important pre-requisite for patients to be involved and to feel responsible for their future health.<sup>31</sup> The patient needs scale measures the degree to which the individual's needs were fulfilled in terms of asking questions, understanding answers, being treated respectfully, and discussing results of treatments/examinations. We hypothesized that better fulfilment of one's individual needs would create a better foundation for illness self-management after hospital discharge. Treatment planning deals with the patient's role in discussing examinations and treatment options, treatment goals and participating in planning their post-discharge care. This scale was included as it encompasses some of the most active measures of involvement. For all scales, higher scores indicate more positive ratings. Scale values were calculated for each

respondent by totalling the scores on the component scale items and converting that sum to a percentage of the maximum possible score (100%). Thus, scores for all scales are reported as mean or median percentage scores.

#### SEPHIA data

Ten variables from the SEPHIA database were included in this study and were categorized as medical, behavioural, or secondary prevention outcomes. Each variable was dichotomized for either the absence or presence of a symptom or event at the time of the first follow-up visit. Medical outcomes were cardiovascular symptoms, including chest pain, measured by the Canadian Cardiovascular Society's functional classification of angina, CCS I-IV; and shortness of breath, measured by the New York Heart Association functional classification system, NYHA I-IV. Behavioural outcomes included medication compliance and participation in cardiac rehabilitation. For compliance, cardiovascular medications prescribed for each patient at hospital discharge were compared with the patient's report of medications currently taken at the time of the first follow-up visit. Medications included ACE inhibitors, angiotensin inhibitors, aspirin, oral anticoagulants, thrombocyte inhibitors, beta blockers, calcium antagonists, diabetes medication/insulin, digitalis, diuretics and statins or other lipid-lowering agents. Those patients still reporting taking the medications prescribed at discharge were defined as compliant. Patient participation in cardiac rehabilitation was based on the patient's self-report. Level of achievement was also measured for six secondary prevention goals defined by the American Heart Association and American College of Cardiology.<sup>29</sup> The goals were smoking cessation (for all patients who were smokers at the time of the MI); return to work (applies to patients under 63 years of age who were employed at the time of the MI); physical exercise > 30 min at least five times during the past 7 days (patients with classification CCS II or lower); regular intake of ACE inhibitors or angiotensin receptor blockers

(patients with hypertension, history of heart failure, diabetes, left ventricular dysfunction, pulmonary rales > 50% of the lungs, or pulmonary oedema); systolic blood pressure < 140 mmHg; and LDL cholesterol < 2.5 mmol/l.

In summary, two of the outcome variables – blood pressure and cholesterol – were physiological measurements. The general recommendations for taking blood pressure were that it be taken with the patient in a supine position after 5 min rest. The remaining eight outcomes were based on patient reports.

### Data analysis

Patients' mean scores for the questionnaire scales were analysed for possible group differences on each of the SEPHIA outcome variables. Scale ratings were examined for normality using the Kolmogorov-Smirnov test. As none of the scales were normally distributed, both non-parametric tests (Mann-Whitney *U*) and parametric (independent *T*-tests) were used. Logistic regression was used to examine whether the significant group differences would be confirmed when controlling for patient age, sex, length of hospital stay, and severity of MI, measured as the presence or absence of ST-segment elevation. Regressions were carried out with each of the ten outcome variables as the dependent variable. In each regression, the three questionnaire scales and four controlling variables were entered simultaneously as independent variables. The SPSS statistical software package version 15.0 was used for all statistical analyses. Statistical significance was set at  $P < 0.05$  (two-tailed).

### Ethical considerations

This study was approved by the regional research ethics committee (dossier nr. 03/289), Uppsala, Sweden and the Human Investigation Committee, Wayne State University.

## Results

The mean time between hospital discharge and the first follow-up visit was 8 weeks for all hos-

pitals. Sample characteristics are summarized in Table 2. Of the 591 questionnaire respondents, 142 were lost to follow-up. Thus, all analyses were based on a sample of 449 patients. There were statistically significant differences between questionnaire respondents and non-respondents with regard to age, occupational status and history of previous MI. Compared to non-respondents, a greater percentage of respondents was men (77% vs. 72%,  $P < 0.01$ ) and was currently employed (47% vs. 34%,  $P < 0.01$ ), while a smaller percentage had previously had an MI (12% vs. 23%,  $P < 0.001$ ).

Mean and median percentage scores for all respondents for each of the patient involvement scales are presented in Table 1. Mean scale scores for patients in the SEPHIA register and those lost to follow-up did not differ significantly (data not shown). Mean scores were highest for patient needs and lowest for treatment planning. A comparison of patients' involvement ratings by medical outcomes is summarized in Table 3. Patients reporting angina symptoms at the time of the first follow-up visit (22% of respondents) gave significantly lower ratings to the patient needs scale, compared to patients without angina. Patients reporting shortness of breath (23% of respondents) gave significantly lower scores to the information they received in hospital, compared to patients with no breathing difficulties.

Patient ratings of questionnaire scales by behavioural outcomes are presented in Table 4. Patients who were still taking the medications that had been prescribed at hospital discharge (79% of respondents) did not differ significantly from non-compliant patients on involvement ratings. Approximately one quarter of MI patients reported attending cardiac rehabilitation at the time of the first follow-up. Those patients gave significantly lower ratings to fulfilment of patient needs during hospitalization.

At the time of the first follow-up visit, 72% of patients ( $n = 84$ ) had stopped smoking; 57% ( $n = 235$ ) had achieved target levels for systolic blood pressure; 72% ( $n = 224$ ) had achieved target levels for LDL cholesterol; 46% ( $n = 189$ ) had been regularly physically active;

**Table 2** Characteristics of questionnaire respondents (*n* = 591)

Variable	<i>n</i>	%	Missing ( <i>n</i> )
Sex*			
Female	133	23	3
Male	455	77	
Age*			
30–39 years	3	1	3
40–49 years	37	6	
50–59 years	175	30	
60–69 years	241	41	
≥70 years	132	22	
Highest level of education*			
Compulsory school (through grade nine)	315	54	3
2 years high school/trade school	90	15	
High school 3–4 years	58	10	
University/college	88	15	
Other	37	6	
Work status†			
Working	242	47	73
Sick leave	11	2	
Unemployed	8	1	
Retired	257	50	
Smoking status†			
Never smoked	189	38	89
Ex-smoker > 1 month	176	35	
Smoker	137	27	
Hypertension†			
No	331	63	67
Yes	193	37	
Diabetes mellitus†			
No	442	84	65
Yes	84	16	
Myocardial infarction severity†			
NSTEMI	309	59	67
STEMI/LBBB	215	41	
History of previous myocardial infarction†			
No	463	88	66
Yes	62	12	
History of chronic heart failure†			
No	515	9	64
Yes	12	2	
PCI during hospitalization†			
No	145	28	65
Yes	381	72	
CABG during hospitalization†			
No	481	91	63
Yes, directly upon admission	2	1	
Yes, during hospitalization	18	3	
Planned after discharge	27	5	

\*Data from patient questionnaire.

†Data from SEPHIA register.

NSTEMI, non-ST-segment elevation myocardial infarction; STEMI/LBBB, ST-segment elevation myocardial infarction/left bundle branch block; PCI, percutaneous coronary intervention; CABG, coronary artery bypass graft.

82% (*n* = 225) were on ACE inhibitors or angiotensin blockers; and 53% (*n* = 80) of those eligible had returned to work. Significant associations between patient scale ratings and goal achievement were found for smoking cessation and systolic blood pressure (Table 5). Significantly lower ratings of the patient needs scale were found among patients who had stopped smoking as a result of their MI. Patients who had achieved acceptable blood pressure levels scored significantly lower than patients who had not achieved the goal on treatment planning. No significant associations were found between patient involvement ratings and achievement of goals for LDL cholesterol, exercise, ACE inhibitors/angiotensin blocker compliance, or return to work.

Logistic regression analyses did not confirm the significant associations between scale ratings and medical symptoms (Table 6). Severity of MI was the only significant predictor of angina. The inverse association between participation in cardiac rehabilitation and ratings of patient needs was confirmed, i.e., patients with lower scores on needs' fulfilment were more likely to attend cardiac rehab programmes. The treatment planning scale was a positive but weak predictor of participation in cardiac rehab, only bordering on significance. The inverse association between patient needs and smoking cessation was not confirmed in the logistic regression. Higher ratings of the information scale did predict smoking cessation, but only weakly, with a confidence interval (CI) that encompassed 1.0. Regression analyses confirmed the inverse association between achievement of the goal for systolic blood pressure and lower scores on the treatment planning scale, albeit weakly. Age was also an inverse predictor of blood pressure goal achievement, i.e., younger MI patients were more likely to achieve desired levels. Gender was the only significant predictor of goal achievement for exercise, with women more likely than men to achieve the goal. There were no significant predictors for achievement of the goals for LDL cholesterol, ACE inhibitors/angiotensin blockers, or return to work.

**Table 3** Patient ratings of questionnaire scales: comparison by medical outcomes after discharge

Scale	Information	Patient needs	Treatment planning
Symptoms (n, %)	Median, mean (SD)	Median, mean (SD)	Median, mean (SD)
<b>Angina</b>			
No (350, 78.1)	93.3, 84.7 (18.5)	90.5, 87.8 (14.7)	66.7, 63.6 (24.6)
Yes (98, 21.9)	86.7, 82.2 (19.2)	90.5, 85.6 (14.3)	66.7, 60.7 (25.6)
Z	-1.7	-2.0	-1.1
Significance level	ns	$P < 0.05$	ns
<b>Shortness of breath</b>			
No (343, 76.6)	93.9, 85.2 (18.6)	90.5, 87.6 (14.6)	66.7, 63.6 (24.7)
Yes (105, 23.4)	86.7, 80.9 (18.5)	90.5, 86.5 (14.7)	58.3, 60.8 (25.0)
Z	-2.9	-0.9	-1.1
Significance level	$P < 0.01$	ns	ns

Median %, mean % (SD). Mann-Whitney and *t*-tests, *P*-values based on Mann-Whitney *U*-tests. ns, non-significant.

**Table 4** Patient ratings of questionnaire scales: comparison by behavioural outcomes after discharge

Scale	Information	Patient needs	Treatment planning
Behaviour (n, %)	Median, mean (SD)	Median, mean (SD)	Median, mean (SD)
<b>Medication compliance</b>			
No (95, 21.2)	93.3, 83.4 (20.7)	90.5, 86.7 (15.5)	58.3, 60.3 (26.3)
Yes (353, 78.8)	93.3, 84.4 (18.1)	90.5, 87.5 (14.4)	66.7, 63.6 (24.4)
Z	-0.1	-0.1	-1.1
Significance level	ns	ns	ns
<b>Cardiac rehabilitation</b>			
No (327, 74.7)	93.3, 85.3 (17.2)	90.5, 88.7 (12.2)	66.7, 62.7 (24.3)
Yes (111, 25.3)	86.7, 80.9 (22.1)	90.5, 83.5 (16.2)	66.7, 62.3 (26.4)
Z	-1.2	-2.9	-.01
Significance level	ns	$P < 0.01$	ns

Median %, mean % (SD). Mann-Whitney and *t*-tests, *P*-values based on Mann-Whitney *U*-tests. ns, non-significant.

## Discussion

We hypothesized that higher patient ratings of involvement during hospitalization would be associated with better medical and behavioural outcomes, including better achievement of secondary prevention goals, at the time of the first follow-up visit after hospital discharge. Results indicated that patient ratings were associated with some, but not all, outcome variables, and associations were not always in the hypothesized direction. Furthermore, only two of the significant associations were rather weakly confirmed in the logistic regressions when controlling for patient age, sex, length of hospital stay and MI severity.

In terms of medical outcomes, patients experiencing cardiovascular symptoms were not as satisfied with their involvement as patients without symptoms. Patients with angina at first follow-up did not feel that their needs for involvement had been fulfilled to as great an extent while in hospital, compared to patients without angina. Similarly, patients experiencing shortness of breath did not feel as well-informed as patients without shortness of breath. Fremont *et al.*<sup>21</sup> also found that chest pain after discharge was more common in MI patients who were less satisfied with non-technical aspects of care, such as patient education and discharge planning, during hospitalization. It is possible that patients with coronary symptoms at first



**Table 5** Patient ratings of questionnaire scales: comparison by goal achievement after discharge

Scale	Information	Patient needs	Treatment planning
Goal (n, %)	Median, mean (SD)	Median, mean (SD)	Median, mean (SD)
Stopped smoking			
No (33, 28.2)	93.3, 81.9 (23.7)	100.0, 88.1 (19.5)	75.0, 66.2 (25.9)
Yes (84, 71.8)	93.3, 83.7 (18.9)	90.5, 85.4 (15.2)	58.3, 59.3 (22.1)
Z	-0.1	-2.5	-1.7
Significance level	ns	<i>P</i> < 0.05	ns
Systolic BP < 140 mmHg			
No (178, 43.1)	86.7, 83.7 (19.2)	90.5, 87.0 (15.4)	66.7, 66.2 (25.1)
Yes (235, 56.9)	93.3, 84.3 (18.7)	90.5, 87.4 (14.5)	66.7, 60.9 (25.1)
Z	-0.3	-0.2	-2.1
Significance level	ns	ns	<i>P</i> < 0.05
LDL cholesterol < 2.5 mmol/l			
No (89, 28.4)	93.3, 84.4 (19.4)	92.9, 88.0 (14.7)	66.7, 63.3 (25.5)
Yes (224, 71.6)	93.3, 85.0 (18.3)	90.5, 87.9 (15.0)	66.7, 65.0 (24.8)
Z	-0.0	-0.2	-0.5
Significance level	ns	ns	ns
Exercise > 30 min > 5 times past 7 days			
No (223, 54.1)	93.3, 85.3 (18.0)	90.5, 87.2 (15.1)	66.7, 63.4 (24.0)
Yes (189, 45.9)	93.3, 83.7 (19.9)	95.2, 88.0 (13.9)	66.7, 63.5 (25.3)
Z	-0.4	-0.6	-0.3
Significance level	ns	ns	ns
ACE inhibitors or angiotensin blockers			
No (52, 18.8)	86.7, 84.1 (17.8)	88.1, 84.1 (15.2)	58.3, 60.0 (23.8)
Yes (225, 81.2)	86.7, 79.1 (22.7)	90.5, 87.2 (15.5)	66.7, 64.0 (24.2)
Z	-1.3	-1.7	-1.2
Significance level	ns	ns	ns
Return to work			
No (70, 46.7)	93.3, 85.1 (17.2)	95.2, 89.3 (13.1)	66.7, 63.5 (23.8)
Yes (80, 53.3)	93.3, 87.7 (16.4)	90.5, 86.6 (15.4)	58.3, 60.6 (24.2)
Z	-1.0	-1.2	-0.7
Significance level	ns	ns	ns

Median %, mean % (SD). Mann-Whitney and *t*-tests, *P*-values based on Mann-Whitney *U*-tests.

**Table 6** Predictors of medical, behavioural and goal achievement outcomes. Outcomes defined as yes (1) vs. no (0). Independent variables: information, patient needs and treatment planning scales

	Predictors	$\beta$	OR	95% CI	<i>P</i> -value
Medical outcomes					
Angina	Severity of MI (reference = NSTEMI)	0.67	1.95	1.16–3.29	0.012
Behavioural outcomes					
Cardiac rehabilitation	Patient needs	-0.03	0.97	0.95–0.99	0.005
	Treatment planning	0.01	1.01	1.00–1.025	0.047
Goal achievement					
Smoking cessation	Information	0.05	1.05	1.00–1.09	0.028
Systolic blood pressure	Treatment planning	-0.01	0.99	0.98–1.00	0.014
	Age	-0.06	0.94	0.92–0.97	0.000
Exercise	Gender (reference = male)	0.57	1.77	1.03–3.04	0.038

All analyses controlled for patient age, gender, length of hospital stay, and severity of MI, measured as the presence (STEMI) or absence (NSTEMI) of ST-segment elevation. OR, odds ratio; CI, confidence interval.

follow-up may have been sicker in hospital, and therefore less attentive or receptive to information offered. They may also have sought less information, asking fewer questions, because of their illness conditions. Questionnaires were filled out retrospectively, and it may be that patients experiencing these cardiovascular symptoms were disappointed over not feeling better, and this may be reflected in their involvement ratings. Larsson *et al.*<sup>32</sup> surveyed patients about their views of involvement in the decision-making process both before and after surgery. They reported that patients who were less satisfied with their operation or post-operative care reported being less involved in the initial decisions about surgery. A recent study found an association between angina and current treatment satisfaction among patients six months post-MI,<sup>33</sup> but that study was cross-sectional and cause and effect could not be determined.

Findings were not as hypothesized regarding health behaviours. No significant association was found between patients' medication compliance and experience with involvement while in hospital. Patients who reported having participated in cardiac rehabilitation gave significantly lower ratings to the patient needs scale, compared to patients who did not participate. The needs scale encompasses items regarding having had the opportunity to pose questions; understanding the information received; being treated with respect; and feeling that staff were sensitive to one's needs or requests. One possible explanation is that patients who did not feel their involvement needs were fulfilled in-hospital may have sought help and answers to their questions via organized programmes after discharge. Rehab attendees may have felt a stronger motivation to participate in organized training, to gain a better understanding of their illness and improve their condition. French *et al.*<sup>34</sup> found a greater likelihood of attending cardiac rehab among MI patients who believed that their condition had severe consequences. This may have been the case among rehab attendees in this study, although we did not measure beliefs in illness consequences.

There were only two significant associations between patients' ratings of involvement during hospitalization and achievement of secondary prevention goals by first follow-up. In both cases, findings were not in the hypothesized direction. Patients' who had stopped smoking in conjunction with their MI gave lower ratings to the patients needs scale, compared to smokers who did not achieve the smoking cessation goal. One explanation may be that patients who had given up smoking were generally more negative. However, ex-smokers' ratings of the other scales were not systematically lower than those of current smokers. Those who achieved acceptable systolic blood pressure levels scored significantly lower on treatment planning. As with smoking cessation, short-term goal achievement seemed to be associated with a certain degree of dissatisfaction with in-hospital patient involvement, rather than satisfaction and higher ratings, as hypothesized. Similar findings were recently reported by Baldwin *et al.*<sup>35</sup> who found that hypertensive patients who preferred a patient-centred role received more information about their hypertension medication, but had higher blood pressure and LDL cholesterol levels. These results indicate that the association between patient-centred care – of which active involvement is a key feature<sup>35</sup> – and clinical markers is not necessarily straightforward or positive.

Only two of the significant findings in the tests of association were confirmed in the logistic regressions, which controlled for the other scales and possible confounders. The patients needs score was confirmed as an inverse predictor of attendance in cardiac rehabilitation, a finding that is counterintuitive. Considering the recognized benefits of cardiac rehabilitation,<sup>36</sup> these results suggest that further research is needed regarding in-hospital patient-provider communication that will motivate MI patients to attend.

Other findings regarding the involvement scales and outcomes were weak, with 95% CIs that encompassed 1.0. The more robust findings in the regression analyses concerned severity of MI as a predictor of angina, age as a predictor of achievement of the blood pressure goal, and gender as a predictor of achievement of the

exercise goal. These results suggest that MI patients' ratings of their involvement were secondary to these other factors in predicting health outcomes 6–10 weeks after hospital discharge.

### Limitations

This study was exploratory in nature and has several limitations that should be considered when interpreting the results. First, 142 patients, representing nearly one quarter of questionnaire respondents, were lost to follow-up in the SEPHIA register. This is a common problem in studies using registry data, and raises the issue of bias in studying health outcomes.<sup>37</sup> Patient ratings of the involvement scales did not differ significantly between those included in the SEPHIA registry and those lost to follow-up. However, it is not possible to know whether these groups differed in health outcomes. Patient responses to the questionnaire were made after hospital discharge and were thus retrospective, allowing room for recall bias. In addition, the time of the first follow-up visit, when patients received the questionnaire, varied between hospitals, with patients responding in different phases of post-MI recovery. Selection bias could also have influenced results. It is likely that the 11 hospitals agreeing to participate in this study were especially interested in patient involvement issues. Hospitals were instructed to distribute questionnaires to all consecutive SEPHIA MI patients during the 1-year study period. However, we do not know whether the variation in numbers of questionnaires distributed was only due to actual numbers of patients, or to possible oversight or selection. Results may also have been influenced by bi-directional relationships, with patients with improved health outcomes more satisfied with their in-hospital involvement, as reported by Larsson *et al.*<sup>32</sup> Halo effects in appraisal of involvement are also possible, especially in patients with improved health outcomes. However, the fact that results were not consistently in the same direction, *i.e.*, positive involvement ratings were not necessarily associated with better outcomes, suggests that the possible effects of these confounders on our

results were minimal. Moreover, our findings encompassed both self-report and objective data, thus decreasing the likelihood of such relationships. However, objective measurements, such as blood pressure, were not formally standardized and may also have been subject to measurement discrepancy, as it is not known to what degree hospitals followed the general recommendations. It is possible that patients' primary care physicians may have stopped certain prescriptions prior to the patient's first follow-up visit, thus influencing compliance measures. However, cardiology departments in the SEPHIA register report that medications are seldom altered before the 1-year follow-up. All questionnaire constructs, both those measuring perceptions and those measuring patient behaviour in hospital, were self-reported. The analyses did distinguish significant differences in questionnaire scores between patient groups, and higher scores were not necessarily associated with better outcomes. This indicates that the sample, as a whole, did not respond purely according to social desirability. However, a closer look at the differences in mean percentage scores between patient groups, and respective standard deviations, revealed relatively small effect sizes for most of the ten outcome variables. The study encompassed a total of 30 tests of association, *i.e.*, ten outcome variables in relation to three scales, presenting the problem of multiple comparisons. However, only four of the thirty were statistically significant, with two (shortness of breath and cardiac rehabilitation) at the 0.01 level. Moreover, logistic regression analyses examined all three scales and all confounding variables simultaneously, to minimize the risk of attributing variance to any one independent variable. Thus, despite possible methodological shortcomings, there were few statistically significant results, indicating that findings are likely not inflated.

### Conclusion

This study represents a first attempt to examine possible associations between patient involvement in MI care and short-term health and

secondary prevention outcomes. Outcomes of interest were both self-reported, such as angina and shortness of breath, as well as objective measures of blood pressure and cholesterol levels. Two outcome variables – angina and shortness of breath – were in the hypothesized direction, i.e., fewer cardiovascular symptoms were related to higher involvement scores. Conversely, participation in cardiac rehabilitation and achievement of goals for smoking cessation and blood pressure were significantly associated with lower involvement ratings. Significant associations, both inverse, were only weakly confirmed for participation in cardiac rehabilitation and systolic blood pressure when controlling for patient age, sex, length of stay and MI severity. Thus, while patient involvement ratings were related to some outcomes, this study indicates that involvement during hospitalization was not associated with MI patient health and behaviour 6–10 weeks after hospital discharge to the extent hypothesized.

#### Future research

These results indicate that much is still lacking in our understanding of the possible links between involvement and patient health. At the root of patient involvement is the interaction and communication between care providers and patients. However, the pathways through which effective communication might lead to better outcomes are still unclear,<sup>38</sup> and reviews of the existing research conclude that stronger evidence for effective methods for improving patient involvement is needed.<sup>13,14</sup> Other mechanisms, such as placebo and nocebo effects and reduced stress and anxiety, may also be facilitated by improved involvement and treatment efficacy. Future research should focus on pinpointing which specific aspects of involvement have a measureable effect on specific health behaviours and outcomes, and by what means. This study utilized a broad definition of patient involvement that encompassed both active (treatment planning) and passive (fulfilment of patient needs, receiving satisfactory information) aspects. Future studies might benefit by

addressing these aspects separately, to better evaluate the contribution of each aspect to specific changes in behaviour and/or improved health outcomes. In the case of MI, prospective studies that track patient involvement, secondary preventive behaviour, and health over time would enhance this research by diminishing the effects of retrospective appraisal. It is possible that many MI patients are still relatively traumatised by their illness experience 6–10 weeks post-discharge, and not ready to take charge of their situation by, for example, attending cardiac rehabilitation programmes. Future analyses will examine behavioural and health outcomes 1 year post-discharge in the patient cohort described in this study. Such studies will examine the stability of these findings over time and further test our hypothesis regarding the importance of patient involvement during hospitalization for acute illness.

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#### Conflict of interest

None.

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