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Role of patients' view of their illness in predicting return to work and functioning after myocardial infarction: longitudinal study

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Abstract

Objective—To examine whether patients' initial perceptions of their myocardial infarction predict subsequent attendance at a cardiac rehabilitation course, return to work, disability, and sexual dysfunction.

Design—Patients' perceptions of their illness were measured at admission with their first myocardial infarction and at follow up three and six months later.

Setting—Two large teaching hospitals in Auckland, New Zealand.

Subjects—143 consecutive patients aged under 65 with their first myocardial infarction.

Main outcome measures—Attendance at rehabilitation course; time before returning to work; measures of disability with sickness impact profile questionnaire for sleep and rest, social interaction, recreational activity, and home management; and sexual dysfunction.

Results—Attendance at the rehabilitation course was significantly related to a stronger belief during admission that the illness could be cured or controlled ($t=2.08$, $P=0.04$). Return to work within six weeks was significantly predicted by the perception that the illness would last a short time ($t=-2.52$, $P=0.01$) and have less grave consequences for the patient ($t=-2.87$, $P=0.005$). Patients' belief that their heart disease would have serious consequences was significantly related to later disability in work around the house, recreational activities, and social interaction. A strong illness identity was significantly related to greater sexual dysfunction at both three and six months.

Conclusions—Patients' initial perceptions of illness are important determinants of different aspects of recovery after myocardial infarction. Specific illness perceptions need to be identified at an early stage as a basis for optimising outcomes from rehabilitation programmes.

Introduction

Recent developments in treatment during the acute stage of myocardial infarction have resulted in improved survival and fewer complications for patients.[1] However, these gains in the acute phase of the illness contrast with the small progress that has been achieved in understanding and improving the rehabilitation phase of the illness.[2] The difficulties patients face after leaving hospital in terms of changing their lifestyle and regaining their vocational, sexual, and other functioning may be considerable. As more patients survive myocardial infarction this aspect has become even more important.

Much of the available evidence suggests that psychological factors become more important than medical factors in directing the recovery process after a myocardial infarction.[3][4] Recently, more attention has been directed to how patients' cognitive representations of their illness are associated with adjustment and rehabilitation in several medical conditions.[5][6] Research suggests that patients group their ideas about illness around five coherent themes or components, which health psychologists have called illness perceptions.[7] These provide a framework for patients to make sense of their symptoms, assess health risk, and direct action during recovery. The five main cognitive components are:

• Identity—the label the person uses to describe the illness and the symptoms the patient views as being part of the disease

• Cause—personal ideas about the cause of the illness

• Time line—how long the patient believes the illness will last

• Consequences—expected effects and outcome of the illness

• Cure or control—how the patient recovers from or controls the illness.

Previous research on heart disease has highlighted the importance of personal models of illness to recovery after myocardial infarction. Clinicians have noted that patients may develop quite idiosyncratic ideas about what has happened to their heart and their likelihood of recovery[8]—an extreme example is cardiac invalidism. Researchers have noted that patients' negative expectations about their illness and future work capacity while in hospital have been associated with slower return to work and impaired functioning.[9][10] Attendance at rehabilitation programmes and adoption of changes in lifestyle are ongoing issues—some patients do not attend such programmes[11] or they cannot make the long term changes to diet and lifestyle after them. One recent study found that patients who were judged by staff to view their illness less seriously were less likely to attend cardiac rehabilitation.[12] This has prompted some to

argue that a rehabilitation programme cannot be successfully started with patients who have had a myocardial infarction unless they have developed compatible personal models of their illness.[13] Until recently there was no efficient way of assessing patients' models of illness. The development of a new scale, the illness perception questionnaire,[14] has facilitated what we believe to be the first systematic longitudinal investigation of the role of illness perceptions in recovery from myocardial infarction.

We investigated the relation between the patients' personal model of their myocardial infarction at the time of hospital admission and their subsequent rehabilitation. We examined the relation of four illness perceptions (identity, time line, consequences, and cure or control) on admission to attendance at a cardiac rehabilitation programme, the time taken to return to work, functioning outside work, and sexual difficulties three and six months later.

Patients and methods

The participants in this study were 143 consecutive patients aged 65 or under with a confirmed first myocardial infarction who had been admitted to Auckland and North Shore Hospitals. The study started in August 1993 and was approved by the ethics committee. Patients gave their informed consent to be studied; six patients who fulfilled the research criteria refused to participate.

The mean age of the sample was 53.2 years (SD 8.4) and 124 of the subjects were men. Most subjects (127) were European in origin; five were Maoris, five were Pacific Islanders, and four were from other races. At the time of their myocardial infarction 128 subjects volunteered their employment status: 77 worked full time, 12 worked part time, 23 were retired, and 16 were receiving unemployment benefit or worked in the home. The average stay in hospital was 6.8 (4.1) days.

Subjects completed a research questionnaire while they were in hospital and three and six months later. Over the six months of follow up four subjects died and another five formally withdrew from the study. At the three month follow up 104 of the original 143 subjects were traced and returned questionnaires (73%) and at the six month follow up 115 subjects returned questionnaires (80%). More subjects were traced at the six month follow up as we used general practitioner records to trace those who had moved since their myocardial infarction.

ILLNESS SEVERITY

Peak creatine kinase activity and length of stay in hospital were collected from hospital notes and used as measures of the severity of illness and complications.

ILLNESS PERCEPTIONS

Illness perceptions were derived from four scales of the illness perception questionnaire, which is of known validity and reliability in several chronic illnesses.[14] These scales assessed the identity, time line, consequences, and cure or control dimensions that underlie patients' representations of illness.

Identity is assessed by the number of symptoms patients endorse as being part of their illness from a list of symptoms (15 items). This list includes not only symptoms that are usually associated with heart disease, such as chest pain, breathlessness, and loss of strength, but also symptoms that are not usually related to myocardial infarction, such as sore eyes and stiff or sore joints. Scores on this scale range from 0 to 15.

Items for the remaining three scales are rated by the patient on a five point scale ranging from strongly agree to strongly disagree. The consequences scale consists of nine items; scores range from 9 to 45, with higher scores indicating the perception of serious consequences. Examples of items from this scale are: "My illness is a

serious condition" and "My illness will have major consequences for my life." The time line scale consists of three items; scores range from 3 to 15, with high scores signifying a belief that the illness will last a long time. An example of an item from this scale is: "My heart problems will last a long time." The cure or control scale contains six items such as "My treatment will be effective in curing my illness" and "There is a lot I can do to control my symptoms." Scores on this scale range from 6 to 30, with high scores indicating a belief that the illness can be controlled or cured.

ANXIETY AND DISTRESS

We used the five item mental health index to measure anxiety and psychological distress.[15] This scale is used as part of both the short form 36 and short form 20 health questionnaires and is highly correlated with other measures of anxiety and depression.[15]

ATTENDANCE AT REHABILITATION PROGRAMME, RETURN TO WORK, AND DISABILITY

All patients at both hospitals are referred to an outpatient cardiac rehabilitation programme of six sessions after a myocardial infarction. We obtained information on their attendance from records collected by the programme. The time taken to return to work was measured in the three and six month questionnaires as the time between admission and the date of first returning to work.

We used the sickness impact profile, which is of known validity and reliability in several illnesses,[16] to measure disability after myocardial infarction. We used the four subscales most relevant to function and recovery from myocardial infarction apart from the subscale relating to work. These subscales (with sample items) were sleep and rest ("I spend much of the day lying down in order to rest"), home management ("I am doing less of the daily work around the house than I would usually do"), recreation ("I am going out for entertainment less often"), and social interaction ("I talk less with those around me").

SEXUAL DYSFUNCTION

Sexual dysfunction was assessed by the four item sexual functioning scale developed from the medical outcomes study.[15] This test was developed to measure sexual problems and dysfunction in patient populations and has been validated and shown to be reliable as a measure of sexual functioning.[15] Subjects score items including lack of sexual interest and difficulty in becoming sexually aroused on a four point scale ranging from not a problem to very much a problem.

STATISTICAL METHODS

Statistical analysis was carried out with the SPSS for Windows statistical software package. The relations between the independent variables were examined using Pearson correlation coefficients. Comparison of differences between those who did and did not attend the rehabilitation programme and between those who returned to work within six weeks and those who returned later were carried out with independent t tests, the Mann-Whitney U test, and χ^2 tests. A stepwise multiple regression procedure was used to examine the relation between illness perceptions and later disability.

Results

Table 1 shows the correlations between the independent variables in the study. The pattern of the relation between variables measured in the illness perception questionnaire is consistent with that seen in other illnesses.[14] Patients who believed that their illness could be cured or controlled thought that it would be shorter and less serious than did patients who thought that their illness could not be controlled. The expectation of a long illness was related to perceptions of serious consequences and physical symptoms in association with the

Table 1—*Pearson correlation coefficients for relations between independent variables*

	1	2	3	4	5	6	7	Mean (SD) score
1= Identity								8.0 (3.5)
2=Time line	0.20*							8.9 (2.5)
3=Cure/control	-0.07	-0.32**						23.5 (3.5)
4=Consequences	0.26**	0.51**	-0.09					27.4 (5.8)
5=Mental health index	-0.32**	-0.20*	0.20*	-0.41**				53.8 (12.8)
6=Age	-0.14	-0.11	-0.12	-0.28**	0.10			53.2 (8.4)
7=Days in hospital	-0.06	0.04	-0.01	0.03	-0.01	-0.03		6.9 (4.2)
8=Peak creatine kinase	0.13	0.18*	-0.03	0.14	-0.14	-0.13	0.24*	1811.8 (1472.4)

*P<0.05. **P<0.01.

Table 2—*Mean (SD) scores for variables for patients who did and did not attend cardiac rehabilitation programme*

Variable	Attenders (n=89)	Non-attenders (n=39)	t Value	P value
Identity	8.0 (3.5)	7.4 (3.1)	0.99	0.32
Time line	8.8 (2.6)	9.1 (2.6)	-0.60	0.54
Cure/control	24.0 (3.2)	22.6 (4.1)	2.08	0.04
Consequences	27.7 (6.0)	25.7 (5.2)	1.81	0.07
Mental health index	53.3 (12.5)	57.9 (11.0)	-1.91	0.06
Age	52.9 (8.0)	53.5 (8.9)	-0.33	0.75
Days in hospital	7.1 (5.0)	6.3 (2.0)	1712.00*	0.98
Peak creatine kinase	1812.7 (1527.8)	2035.4 (1453.5)	1217.00*	0.38

*U value, Mann-Whitney U test.

Table 3—*Mean (SD) scores for variables for patients according to when they returned to work**

Variable	Returned to work within 6 weeks (n=40)	Returned to work after 6 weeks† (n=36)	t Value	P value
Identity	7.5 (3.6)	8.4 (3.2)	-1.17	0.25
Time line	8.3 (2.4)	9.8 (2.7)	-2.52	0.01
Cure/control	23.9 (4.4)	23.6 (3.4)	0.29	0.78
Consequences	25.7 (5.5)	29.4 (5.8)	-2.87	0.005
Mental health index	57.2 (10.8)	52.4 (13.1)	1.74	0.09
Age	53.1 (7.2)	50.6 (8.1)	1.45	0.15
Days in hospital	7.2 (5.6)	7.5 (4.8)	666.50‡	0.70
Peak creatine kinase	1672.9 (1279.7)	2400.2 (1844.0)	494.00‡	0.09

*Applies to patients who were in full time employment before myocardial infarction.
†Includes those who had not returned to work by six month follow up.
‡U value, Mann-Whitney U test.

disorder. High scores on the mental health index (good psychological health) were related to low scores in all illness perception scales apart from the belief that the illness could be cured or controlled. The younger the patients the more likely they were to perceive their myocardial infarction as having negative effects on their life.

Although both the time in hospital and peak creatine kinase activities were significantly correlated, they were largely unrelated to the patients' perceptions of their illness or psychological distress. The exception to this was the perception of how long the illness would last, which was significantly related to peak creatine kinase activity.

Data on attendance at the outpatient rehabilitation programme were obtained for 128 of the 143 subjects. Of these, 39 (31%) failed to attend any sessions and their illness perceptions were compared with those of patients who attended some or all of the sessions (table 2). In terms of illness perceptions, non-attenders had a significantly lower expectation that their illness could be controlled or cured. There was also a trend for non-attenders to believe that their myocardial infarction held less serious consequences for them in the future and for them to be less distressed by their infarction. Attendance at the rehabilitation programme was not, however, significantly related to perceptions about the

time line or identity or to age, length of stay in hospital, peak creatine kinase activity, or sex (78 of the 114 men v 11 of the 14 women, $\chi^2 = 0.61$; df = 1; P = 0.44).

To examine the effect of illness perceptions on return to work an analysis was carried out on the subjects who were in full time paid employment at the time of their myocardial infarction. Men constituted 71 of the 76 subjects (93%) in previous full time employment. Over 60 (79%) of these subjects had returned to work within three months (median 6 weeks, mean 7.6 (5.4) weeks). Differences between those subjects in previous full time employment who had returned to work within six weeks of their myocardial infarction and those who had returned later than six weeks or had not returned to work at the six month follow up were examined using a one way analysis of variance. Table 3 shows that patients who thought that their illness would last a short time and have less serious consequences returned to work earlier. Although the time in hospital was not significantly different between the two groups, there was a trend for peak creatine kinase activity and anxiety to distinguish the groups: patients who had had a severe myocardial infarction and who were less anxious were less likely to return to work within six weeks. Whether the patient had attended the rehabilitation course was also not significantly related to the speed of returning to work: 26 of the 40 patients returning early to work had attended the course whereas 28 of the 36 patients who did not return to work in this time had not attended it ($\chi^2 = 1.5$, df =1; P = 0.22).

Stepwise multiple regression was performed examining the degree of disability outside work at three and six months with the sickness impact profile subscales for sleep and rest, home management, recreation, and social interaction as dependent variables and illness perceptions as independent variables. Before this analysis we calculated correlation coefficients between the sickness impact profile subscales (at three and six months) and peak creatine kinase activity, days in hospital, age, and mental health index. Peak creatine kinase activity and days in hospital were not significantly related to any of the subscales. However, both age and the mental health index were significantly correlated with disability in social interaction at both three and six months and so were included with the illness perception variables as predictors in the stepwise multiple regression analysis examining disability in social interaction.

The results from the multiple regression analyses showed that baseline illness perceptions explain a modest amount of variance in disability at the three and six month follow ups. Patient's view of the consequences of the illness had the strongest and most consistent relation to functioning outside work, with the belief that the illness would have major consequences being associated with greatest disability. For the social interaction scale of the sickness impact profile baseline scores for consequences and identity explained 20% of the variance at three months; at six months only consequences entered the equation, explaining 12% of the variance in disability in social interaction. Consequences scores also predicted 5% of the variance in the recreation score of the sickness impact profile at three months and 11% of the score at six months. Baseline scores for consequences also explained 8% of the variance in the home management score of the sickness impact profile at three months and 6% at six months, with the baseline cure or control score explaining an additional 4% of variance at three months.

Illness identity scores explained 4% of the variance in the sexual dysfunction scale at three months, and this increased to 7% at the six month follow up. This indicates that patients who associated a large number of symptoms with their illness in hospital were more likely to suffer from later sexual difficulties. Illness perceptions were not, however, predictive of the sleep and rest score of the sickness impact profile at either three or six months.

<table>
<tr><th colspan="2" style="text-align:center">Key messages</th></tr>
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• After a myocardial infarction many patients fail to return to work or resume their previous level of functioning despite being physically able to do so

• Patients' beliefs about their illness seem to influence recovery and rehabilitation on discharge from hospital

• Patients' ideas about their illness cluster around five cognitive dimensions: identity, cause, time line, consequences, and beliefs about cure or control

• In this study a belief that the illness could be controlled or cured was related to subsequent attendance at a cardiac rehabilitation course. Perceptions that the illness would last a long time and have serious consequences were associated with a longer delay before returning to work

• The early identification of illness perceptions could improve the outcome of cardiac rehabilitation programmes

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Discussion

Our study shows that patients' illness perceptions or beliefs after a myocardial infarction are important determinants of their recovery after discharge from hospital. Illness perceptions measured on admission were associated with attendance at rehabilitation programmes, speed of return to work, later sexual difficulty, and recovery of social and domestic functioning. As would be expected, different illness perception components were related to particular rehabilitation domains (in this paper: attending a rehabilitation programme, returning to work, resuming social and domestic duties, and resuming sexual activity). Patients who strongly believed that their illness was amenable to cure or control were more likely to attend rehabilitation programmes whereas those who anticipated that their illness would have major consequences on their life were slower to return to work and regain social and domestic duties. Patients' initial perception of illness identity, as indicated by the number of symptoms associated with the illness, was related to later sexual problems.

One interpretation of these results is that patients' perceptions about their myocardial infarction seem to be largely formed by information before becoming ill, as evidenced by the early emergence of coherent illness perceptions. These beliefs seem to be quite consistent over time and largely unaffected by later information presented in hospital or after discharge.[14] Moreover, since the beliefs may not necessarily correspond with medical views of the illness, medical staff may not be aware of these differences, particularly as patients are generally reluctant to ask questions or discuss their personal views of their illness in their consultations.[17]

We emphasise that our results are not attributable to the effects of anxiety during admission or to the severity of the myocardial infarction. Although patients' perceptions are related to their degree of psychological distress, these perceptions are still better predictors of later functioning than general anxiety. Furthermore, whereas the severity of the myocardial infarction is an important factor in recovery, this study has shown that it is the meaning or perception of the patient's illness experience that is more influential in determining adaptation in the rehabilitation phase.

We believe that this study has important implications for cardiac rehabilitation. The assessment of illness perceptions may have a valuable role in identifying which patients are likely to benefit from rehabilitation programmes as they are currently structured. Patients who perceive that their heart disease has little hope of being controlled may benefit from another intervention before attending a rehabilitation programme. This intervention could be specifically targeted at changing this perception. Perhaps more importantly, future research should examine the efficacy of brief psychological interventions designed to elicit and if necessary modify specific illness perceptions as a basis for improving attendance at rehabilitation as well as facilitating adaptation and return to work.

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Important correction

Income distribution and mortality: cross sectional ecological study of the Robin Hood index in the United States

A data transposition error occurred in table 4 of this paper by Bruce P Kennedy *et al* (20 April, pp 1004-7). The corrected data are presented below. This correction indicates that the Gini coefficient measure of income inequality is also strongly associated with mortality, contrary to the authors' initial conclusions.

Table 4—*Correlations between cause of death and Gini coefficient*

Cause of death	r	P value
Total mortality	0.51	<0.001
Infant mortality	0.47	<0.001
Heart disease	0.43	<0.002
Malignant neoplasms	0.21	<0.134
Cerebrovascular disease	0.28	<0.047
Homicide	0.72	<0.001
Infectious diseases	0.45	<0.001
Hypertensive disease	0.43	<0.002
Tuberculosis	0.67	<0.001
Pneumonia and bronchitis	0.30	<0.033