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Title: Newly diagnosed heart failure - change in quality of life, mood and illness beliefs in the first six months after diagnosis.

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Abstract: Objectives: This study sought to examine how patients' mood and quality of life (QoL) change during the early high risk period after a diagnosis of heart failure (HF) and to identify factors that may influence change.

Design: A within-subjects, repeated-measures design was used. Assessments took place within 4 weeks of diagnosis and six months later.

Methods: 166 patients with HF completed assessments of their mood, QoL and beliefs about HF and its treatment. Correlation analysis was conducted between the variables and ANOVA and t-tests were used to assess differences in categorical variables. To examine which variables predicted mood and QoL, hierarchical multiple regressions were conducted including all significant variables identified from the univariate analyses.

Results: At follow-up, patients' beliefs indicated a realisation of the chronicity of their HF, however their beliefs about the consequences of having HF did not change and their satisfaction with their treatment remained high. Quality of life and anxiety improved significantly over time but there was no significant change in depressed mood. As would be expected, improvement in symptoms was a key factor in improved mood and QoL. Other significant explanatory variables included age, comorbid chronic obstructive pulmonary disease (COPD), depressed mood, patients' beliefs about the consequences of their HF and their concerns about treatment.

Conclusions: This study suggests that addressing patients' mood and beliefs about their illness and its treatment may be additional ways of improving patient QoL in the early period after the diagnosis of heart failure.

07-June-2011

Dear David Ingledew,  
Editor BJHP

RE: BJHP946R2

Thank you for the further clarification by the statistical editor which we found very helpful.

We have now reanalyzed our data and adopted one of the approaches recommended. All the variables were entered into the regression model using the stepwise method. We trust that you now find the paper acceptable for publication in BJHP.

Kind regards.

Mulligan et al. (2010)

Newly diagnosed heart failure – change in quality  
of life, mood and illness beliefs in the first six  
months after diagnosis.

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**Conclusions:** This study suggests that addressing patients' mood and beliefs about their illness and its treatment may be additional ways of improving patient QoL in the early period after the diagnosis of heart failure.

## **Introduction**

Heart failure is a global health-care issue affecting at least 15 million patients across the United States (US) (Hunt, 2005) and Europe (Swedberg et al., 2005). In the United Kingdom (UK), approximately 2% of the general population live with definite or probable heart failure (British Heart Foundation, 2002; Davies et al., 2001). A further 1-2% of the general population (or approximately 60,000 people) develops incident (new) heart failure annually (Cowie et al., 1999; 2002).

The prognosis after a new diagnosis of heart failure in the general population is poor with particularly high mortality rates in the first few months after diagnosis (Cowie et al., 2000; 2002; Ho et al., 1993). Although prognosis has improved in the past decade, perhaps due to improvements in diagnosis and medical therapy, early mortality remains unacceptably high (Levy et al., 2002; Mehta et al., 2008; 2009). This early high risk period is a time when the health care system is investing considerable effort and resources to stabilise patients' clinical condition, organise a management plan and initiate and titrate drug therapy.

Patients with HF are amongst the patient groups most likely to show compromised QoL. In comparison to other chronic illnesses such as arthritis, myocardial infarction, angina, and chronic obstructive pulmonary disease as well as the healthy population, HF patients appear to have the lowest QoL scores (Hobbs et al., 2002). Specifically, these patients face difficulties in their social life, problems with their personal relationships, and dealing with the number of physical limitations (Jaarsma et al., 1999).

There is also evidence of a high prevalence of anxiety and depression in the HF population. A meta-analytic review by Rutledge et al. (2006) suggested that 21.6% of HF patients experience clinically significant depression, whereas individual studies

report prevalence rates ranging from 9% to 60%. The explanation for this discrepancy in findings may be the consideration of clinically significant depression versus depressive symptomatology assessed with questionnaires. On the other hand, although there is sparse evidence in relation to anxiety, the findings support prevalence rates between 40% and 63% depending on the subgroup of HF patients assessed (Konstam et al., 2005).

Research to date on mood and QoL in HF has focussed on patients with established disease. Less is known about the experiences of people newly diagnosed with heart failure and how their mood and QoL may change in the early period after diagnosis, when treatment is introduced and optimised.

Many factors are likely to influence how patients adapt to a chronic illness such as heart failure. One of those factors is the beliefs people hold about their condition. When people are faced with an illness condition such as heart failure, they create mental representations in order to make sense of and manage their problem. The above notion is the basic assumption of the common-sense model (CSM) of illness representations proposed by Leventhal, Meyer, and Nerenz (1980). The illness representations dimensions in the theory are: 1) Identity, the disease label and its associative symptoms; 2) Timeline, whether the disease is acute, cyclic, or chronic; 3) Causes such as genes, infection, stress, fate; 4) Consequences; and 5) Perceived controllability/curability (Leventhal et al., 1998). According to the theory, the representations people form lead to the choice of coping procedures to manage their illness, which in turn are evaluated in relation to the expected outcomes such as QoL (Leventhal et al., 1992).

In addition to the illness representations people form general treatment representations. These treatment representations have in turn been found to have four



attributes: 1) Treatment value, which is the capacity of the specific treatment regime to control the condition; 2) Treatment concern; 3) Decision satisfaction, which is the satisfaction with the chosen treatment; and 4) Cure, which is the ability of the treatment to resolve the condition (Hirani et al., 2008).

Taking into account these representations helps to explain why patients who appear to have disease of similar severity may cope in different ways and report differing impact of their condition on their QoL. Patients' views of their illness arise not only from the information they receive from health professionals and other sources but also from their own experiences of the illness. Leventhal et al. (1998) argue that people are in "constant interaction with and processing information" from their social context. Heart failure is a chronic, continuously changing condition with a variety of symptom experiences and different treatment pathways. As such, illness beliefs are not static but are likely to change as patients' experience of their illness changes over time.

From diagnosis and with the initiation of treatment in HF, it is to be expected that these beliefs will change and thus influence adaptation. While changes in symptoms would be expected to influence mood and QoL, an important question is whether the way people view their illness and its treatment in this early phase after diagnosis also has an influence on health-related outcomes. A better understanding of how patients with HF think about their condition in the difficult early period at the time of diagnosis, and how this changes over time and influences mood and QoL, would enhance our ability to develop better ways to support patients through this time.

To assess changes in beliefs and adaptation soon after diagnosis and changes in QoL, we examined patients' beliefs and adaptation to HF at the time of diagnosis

and again 6 months after diagnosis in a population-based study conducted in South-east England. A full description of the parent study has been reported previously (Mehta et al., 2008; 2009), but briefly, the study recruited all individuals with a new diagnosis of heart failure from June 2004 to October 2005 in the geographical area served by Hillingdon Hospital, West London and the Conquest Hospital, Hastings. The primary aims of the study were to determine the mode of death on patients in the early period after diagnosis, and to compare prognosis with previous epidemiological studies in the same geographical area (Cowie et al., 2000; Fox et al., 2001).

## **Methods**

### *Design*

A within-subjects, repeated-measures design was used. Baseline questionnaire assessments were completed within 4 weeks of first presentation with heart failure and repeated 6 months later.

### *Participants and recruitment*

Patients were recruited from the districts shared by two UK general hospitals, The Hillingdon Hospital, West London and The Conquest Hospital, East Sussex. All patients who received a first time diagnosis of heart failure, on their attendance at an out-patient clinic or during hospital admission, were eligible for the study. Heart failure was diagnosed according to European Society of Cardiology criteria (Remme & Swedberg, 2002).

Patients were excluded if they did not speak English, were too unwell, and had a current psychiatric disorder or clear evidence of cognitive impairment, which would have made completion of the assessments impossible.

### *Questionnaire Assessments*

Quality of life was assessed using the Minnesota Living with Heart Failure Questionnaire (MLHF) (Rector et al., 1987). This provides a total score and also two subscales for physical and emotional quality of life. In meta-analysis, the MLHF was shown to have satisfactory internal consistency (Cronbach's alpha 0.94 [95% Confidence Interval (CI): 0.91–0.95], test-retest reliability (Intraclass correlation = 0.84) and responsiveness (Garin et al, 2009).

Patients' beliefs about their heart failure were assessed with the Illness Perception Questionnaire (IPQ) (Weinman et al., 1996), which assesses beliefs in 5 domains: (i) identity – the symptoms the person perceives to be related to the illness. The core illness identity symptom list published in Weinman et al (1996) was extended to include some of the common signs and symptoms of heart failure (ii) cause – beliefs about what caused the illness (iii) timeline – perception of the likely time course, (iv) consequences – perception of the effect of the illness, (v) cure/control – beliefs about how amenable the illness is to cure and/or control. This paper focuses on the scores for the major dimensions; patients' beliefs regarding causes are not included. The IPQ has been shown to have satisfactory internal consistency and test re-test reliability and to be able to differentiate between different illness conditions (Weinman et al 1996).

Patients' beliefs about their treatment were assessed using the Treatment Representations Inventory (TRI) (Hirani et al., 2008), which assesses beliefs in four domains: (i) treatment value - beliefs about the positive effects of their treatment in controlling and arresting the progress of their illness, (ii) concerns – emotional impact and concerns about treatment, (iii) cure – patients' beliefs about the ability of the treatment to resolve the illness and return them to their normal life, (iv) decision

satisfaction – patients’ evaluation of the decision process for choosing their treatment. This measure has been shown to have satisfactory internal consistency and to be able to discriminate between treatments among a population of cardiac patients (Hirani et al, 2008).

Patients’ mood was assessed with the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983). This scale provides separate scores for anxiety and depression. Scores of 8 or above indicate possible clinical anxiety/depression while scores of 11 or above indicate probable clinical anxiety/depression. The HADS is widely used and has been validated with cardiac patients (Herrmann, 1997).

### *Clinical assessments*

Clinical variables included echocardiographic evaluation of global systolic function and presence of comorbid illness. New York Heart Association (NYHA) classification was recorded at both time points.

### *Analysis*

Power calculations were performed using GPower 3.0.8. All other statistical analyses were performed using SPSS 15.0 for Windows. The bivariate relationship between variables was examined by correlations (Pearson r correlations for continuous variables, Spearman’s rho for ordinal variables). In the case of categorical independent variables (e.g. gender), differences between categories in QoL and mood were examined by t-test or analysis of variance (ANOVA), as applicable. To examine which variables accounted for most variance in mood and QoL, hierarchical multiple regressions using stepwise method were performed. The independent variables were entered into the regression in blocks in the following order: 1. demographic variables,

2. clinical variables, 3. patients' beliefs about their illness and treatment. Mood was entered into the regressions in which QoL was the dependent variable as a further block. This order was used because it enables examination to be made as to whether psychosocial variables add to the explanation of the dependent variables once the routinely recorded demographic and clinical variables have been taken into account.

### ***Ethics***

The investigation conforms to the principles outlined in the Declaration of Helsinki. The study received approval from the hospitals' Ethics Committees. All patients gave written informed consent.

### **Results**

#### ***Sample***

A total of 396 patients participated in the parent study, of whom 210 (53%) completed the questionnaires at baseline. Participants were younger (median age 72 versus 75,  $p = 0.01$ ), had a greater percentage of males (66% versus 56%,  $p < 0.05$ ) and had increased LV size (5.9 cm versus 5.6 cm,  $p < 0.05$ ) than non-participants. There was no difference between participants and non-participants in baseline NYHA class or left ventricular (LV) function (assessed either by ejection fraction or where this was not possible by visual assessment of left ventricular function by an experienced operator – classified as good (no left ventricular systolic dysfunction), fair (mild to moderate dysfunction) or poor (severe dysfunction) (Choy et al., 1994).

Of those who completed baseline questionnaires, 17 (8%) died within the follow-up period. One hundred and sixty-six (86% of surviving patients) completed all questionnaire assessments at both baseline and six-month follow-up and are

included in the analysis for this paper. Baseline characteristics of the 166 patients who completed questionnaires at both time points are shown in Table 1.

A comparison of baseline values of illness beliefs, treatment beliefs, mood and QoL was made between survivors and those who had died. No significant differences were found.

#### *Change in symptoms between diagnosis and 6-month follow-up*

NYHA classification at diagnosis and follow-up are shown in Table 2. At the 6-month follow-up assessment NYHA classification had improved in 141 (85%) patients, remained unchanged in 22 (13%) and deteriorated in 3 (2%).

At baseline, the most commonly reported symptoms which patients considered to be associated with heart failure (IPQ Identity) were fatigue, breathlessness, loss of strength, dry mouth, swollen ankles, sleep difficulties and a dry cough. The total number of reported symptoms which patients attributed to HF reduced significantly from a mean of 9.17 (SD 4.19) at baseline to 7.90 (SD 4.43),  $p \leq .001$  at six-months. The largest reduction was in the reporting of swollen ankles (Figure 1).

#### *Change in quality of life between diagnosis and 6-month follow-up*

Mean quality of life scores, as measured by MLHF, improved between baseline and 6 months (Table 3). The total score and both sub-scales (physical and emotional) showed significant improvement over time. Physical QoL improved in 69% of patients, remained unchanged in 5% and deteriorated in 26%. Corresponding percentages for emotional QoL were 70%, 12% and 18%.

#### *Change in mood between diagnosis and 6-month follow-up*

At baseline, 37% of patients scored within the range of *'possible'* clinical anxiety (a score of  $\geq 8$ ), of whom 12% were within the *'probable'* clinical anxiety range (a score of  $\geq 11$ ). At 6 months, these had reduced to 11.4% and 10.2% respectively (Sign test,  $Z = -3.02$ ,  $p = 0.003$ ). The corresponding percentages for depression were 18% *'possible'* cases and 6% *'probable'* cases at baseline reducing to 10.2% and 4.8% respectively at 6 months (Sign test,  $Z = -0.63$ ,  $p = 0.53$ ). Mean anxiety scores for the whole sample reduced significantly over time but depression scores did not change (Table 3). Mean anxiety scores improved in 55% of patients, remained unchanged in 14% and worsened in 31%. Corresponding percentages for depression were 43%, 20% and 37%.

#### *Change in illness beliefs between diagnosis and 6-month follow-up*

At baseline, patients generally held positive beliefs about the ability of HF to be cured or controlled. There was more variation in beliefs about the consequences and perceived duration of HF ('IPQ Timeline'). Patients' beliefs in how amenable HF was to cure or control weakened over time and the perceived duration of HF increased. Despite these changes, patients' beliefs regarding the consequences of their HF did not change significantly (Table 3).

#### *Change in treatment beliefs between diagnosis and 6-month follow-up*

At baseline, patients generally held positive beliefs about the value of their treatment and were satisfied with the treatment decisions that had been made. Patients' beliefs in the curative power of their treatment weakened significantly over time, as did their concerns about treatment, but this did not impact on their satisfaction with the

treatment decisions that had been made or on how much they valued their treatment (Table 3).

#### *Factors associated with changes in mood and quality of life*

To examine the factors that may influence changes in mood and quality of life, two sets of multiple regression analyses were performed. The first analysis looked at the extent to which change in quality of life and mood could be predicted from *baseline* variables. The second analysis examined the extent to which *changes* in symptoms and patients' illness and treatment beliefs accounted for changes in quality of life and mood. In these analyses residualised change scores were calculated for NYHA, QoL, mood, illness and treatment beliefs to control for the level of these variables at baseline. Results of the regression analyses are shown in Tables 4, 5, & 6. Post hoc tests of achieved power are shown for each of the regression analyses.

#### ***To what extent do baseline variables predict change in mood and quality of life?***

An analysis of baseline predictors of changes in outcomes may lead to an early identification of individuals at "risk". However very few baseline variables were associated with change in either anxiety or depression in bivariate analysis. Consequently no multivariate analysis was performed on these outcomes.

Baseline variables did account for a small percentage of the variance in change in QoL (12% and 14% of the variance in change in physical and emotional QoL respectively). Table 4 shows baseline predictors of change in the total QoL score and also the physical and emotional subscales. Older patients reported more improvement in emotional QoL. Less improvement in physical and emotional QoL was reported by those with a diagnosis of COPD or hypertension. Patients who perceived greater



consequences of their illness at baseline reported less improvement in emotional QoL. Those who were more anxious at baseline reported less improvement in physical QoL.

***To what extent do changes in symptoms and beliefs predict change in mood and quality of life?***

The regression analysis examining the relationship between *changes* in symptoms and beliefs and changes in anxiety and depression is shown in Table 5. Greater reduction in anxiety in the 6 months following a diagnosis of HF was reported by patients who reported greater reduction in a) the number of symptoms they associated with heart failure (IPQ Identity), b) perceived severity of the consequences of their HF, c) perceived amenability of HF to control/cure and d) concerns about treatment. Greater reduction in depression was reported by patients who showed greater improvement in a) NYHA, and greater reduction in b) self-reported symptoms (IPQ Identity) c) perceived severity of consequences of their illness and d) increasing belief in the ability of treatment to manage the illness.

The regression analysis examining the relationship between change in symptoms and beliefs and change in QoL is shown in Table 6. Greater improvement in total QoL score was reported by patients who did not have COPD, those with more improvement in NYHA, and greater reduction in a) self-reported symptoms (IPQ 'Identity'), b) perceived consequences of the illness and c) depression. Changes in beliefs about treatment were not significant in the final equation. There was some difference between the QoL subscales in significant predictor variables. Age and change in anxiety were predictive of change in emotional but not physical QoL, whereas change in severity of perceived illness consequences was predictive of change in physical but not emotional QoL. Changes in NYHA, self-reported

symptoms and also changes in depression were predictive of change in both physical and emotional QoL.

## **Discussion**

This study has shown that patients report significant reductions in levels of anxiety and improvements in QoL in the six months following the diagnosis of HF. These changes were accompanied by changes in beliefs that reflected patients' growing recognition of HF as a chronic illness, as they perceived HF to be longer lasting and less curable at the 6-month follow-up than at baseline. A similar change was found by Astin et al (2006) in a study of patients' illness representations before and 6-8 months after undergoing elective percutaneous transluminal coronary angioplasty. Despite the realisation of the chronicity of their HF, patients did not change their beliefs about the consequences of having HF, and their satisfaction with their treatment remained high. Furthermore, the concerns about treatment that were expressed soon after diagnosis lessened over time. These findings are reassuring about the impact of early information and treatment of patients with heart failure.

The ability to predict how well people diagnosed with HF will adapt over time would be a great advantage in directing support to those in greatest need. In this study, however, overall baseline variables showed little ability to predict mood or QoL in the subsequent six months. However, having a co-morbid diagnosis of COPD resulted in less improvement in both physical and emotional QoL. It is possible that this may reflect the more limited capacity to improve symptoms in such patients. Of the baseline psychological factors, only the severity of perceived consequences predicted change in QoL, where those patients who perceived their illness to have had greater consequences reported less improvement in their emotional QoL 6 months later. This

finding is in line with the findings of a previous meta-analysis indicating that perceptions of more negative consequences result in a more diminished psychosocial functioning (Hagger & Orbell, 2003). Addressing the early beliefs about the consequences of HF in those who hold particularly negative views at the time of diagnosis may be a useful strategy in assisting patients to have improved QoL.

The extent of the reduction in patients' anxiety over the 6 month period was associated with reductions in their concerns regarding treatment. It is perhaps understandable that many patients will have concerns about starting new medications but these might be expected to reduce over time as their treatment becomes familiar and they derive benefits from it. This finding highlights the independent role of patients' concerns about treatment and its effect on mood. Addressing patients' concerns about their treatment at the time of diagnosis may be an effective strategy to reduce their anxiety earlier in their treatment cycle. A reduction in anxiety was also associated with a weakening of belief in the amenability of HF to control or cure in the multivariate analysis (although the relationship between these two variables was non-significant in the bivariate correlations). The direction of the relation in the multivariate analysis is unexpected and contrary that found between cure/control beliefs and mood that is seen in other research (Hagger & Orbell, 2003). It may be something particular to HF as the patients' growing acceptance of HF as a chronic illness rather than an acute condition may provide some reassurance and lead to reductions in anxiety.

As would be expected, improvement in symptoms was a key factor in improved QoL. Change in NYHA class and self-reported symptoms were the strongest predictors of change in physical QoL in the 6-months following a diagnosis of HF but they were also important predictors of change in emotional QoL. It is

important that change in both NYHA class and self-reported symptoms independently contributed to explaining change in QoL suggesting that these two factors assess different phenomena. Other studies have also observed that patient reports are important predictors of outcome in HF. For example, Ekman and colleagues (2005) examined the prognostic significance of self-reported symptoms of breathlessness, fatigue, oedema and angina. In a multivariate analysis that included NYHA class breathlessness was an independent predictor of increased risk of mortality and all-cause hospitalisation and fatigue was an independent predictor for the development of worsening heart failure.

Changes in the level of depressed mood and in the severity of perceived consequences of HF were also associated with changes in QoL. Despite some variability, there was however no overall change in depression in the study sample. It is widely recognized that depression is an important predictor of outcome in HF but is also under-diagnosed and under-treated (O'Connor & Joynt, 2004). The findings of this study would appear to confirm the importance of depressed mood in affecting QoL, and how the early changes in depression are related to changes in QoL. Examining and attempting to influence patients' mood could provide further benefits in QoL in the period following diagnosis.

Another variable that was significant in explaining change in QoL was change in patients' beliefs about the severity of the consequences of the illness. These beliefs were also predictive of change in mood and were one of the few baseline predictors of change in QoL. Addressing patients' beliefs about the consequences of their HF early in treatment could therefore be another route to enhancing improvements in QoL following a diagnosis of HF. Previous attempts to alter patients' perceptions about their myocardial infarction appear to be successful. In a randomised controlled trial,

Petrie et al. (2002) concluded that their in-hospital intervention which was specifically designed to change patients' illness perceptions resulted in an improved adaptation to MI.

This study has shown that change in NYHA class and the number of symptoms patients attribute to their heart failure account for much of the change in QoL in the 6-months following a diagnosis of HF. Nevertheless, change in QoL is not only associated with symptoms but also with depression and the severity of the consequences that patients perceive HF to have had on their lives. These suggest focusing on mood and illness beliefs are potentially additional important ways in which HF patients' QoL could be improved, irrespective of improvement in control of the severity of symptoms. This may be particularly important for those in whom medical therapy does not alleviate symptoms to a large degree: in a primary care-based study from the UK, of those with a confirmed diagnosis of heart failure and who were on treatment, none of 449 had no symptoms (NYHA Class I), 63% had symptoms on moderate exertion (NYHA Class II), 21% had symptoms on mild exertion (NYHA Class III) and 16% had symptoms at rest (Hobbs et al., 2002).

### ***Limitations of the study***

Not all patients were well enough or willing to complete the questionnaires and some demographic and clinical differences were found between participants and non-participants. Of these, age was found to be a significant variable in predicting change in QoL therefore the younger age of questionnaire completers may have had some impact on study findings. Also, there were too few non-Caucasian patients in the study (n = 8, 4.8%) to comment on possible differences in associations in those with a different cultural background.

We used questionnaires to assess quality of life, illness beliefs, treatment beliefs and mood that are generally accepted as reliable, valid and responsive. The disease specific health-related quality of life questionnaire, Minnesota Living with Heart Failure questionnaire, has been criticized for being insensitive to small changes in quality of life (Green et al., 2000). However, we report a large change in the quality of life score in many of the study participants between the two measurement points, and a recent meta-analysis has confirmed that this questionnaire is highly responsive to changes in control of the heart failure syndrome (Garin et al., 2009).

We used the original version of the IPQ, which has been extensively used in research that has confirmed the hypothesized associations with psychological outcomes and health behaviours. A revised version of the questionnaire has been developed (Moss-Morris et al., 2002) which extends the original dimensions and adds assessment of emotional representations and illness coherence. However, the items in the original measure remain in the revised version so use of the latter may have enriched our findings but not overturned them.

We did not include a measure of coping in the study. The self-regulation model (Leventhal et al., 1998) proposes that illness beliefs give rise to coping responses, which impact on health outcomes. Assessment of coping may have helped to gain a richer understanding of the relationship between changes in illness beliefs and their relation to change in mood and QoL in heart failure.

Questions still remain about the causal direction in the relationship between change in illness beliefs and change in QoL. It is quite plausible that change in symptoms directly influences QoL and this in turn changes patients' illness beliefs. The self-regulatory model suggests that adapting to a chronic illness is a dynamic process in which all of these interact and influence each other. So for example, while

an improvement in symptoms may change a person's view about their illness, pre-existing illness beliefs may influence how a person interprets their symptoms.

## **Conclusion**

The present study provides an insight into how patients' beliefs about their illness and treatment, and changes in these variables, affect QoL and mood in the short-term after diagnosis and initiation of treatment.

The study demonstrates that in addition to symptoms, patients' emotional state and QoL change significantly in the early period following a new diagnosis of heart failure. Importantly, the association of these changes with psychological factors suggests that closer attention to patients' beliefs about their HF and its treatment at the time of diagnosis have the potential to improve QoL and aspects of mood at least in the short term.

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Table 1

*Baseline Patient Characteristics*

Demographic	
N	166
Age, median (range)	73 (25-91)
Male, n (%)	111 (66.9)
Clinical	
Inpatient / outpatient, n (%)	123 (74.1) / 43 (25.9)
NYHA class at time of diagnosis, n (%)	
II	19 (11)
III	64 (39)
IV	83 (50)
Main comorbidities, n (%)	
Diabetes mellitus	28 (17)
Hypertension	80 (48)
COPD/asthma	28 (17)
Myocardial infarction	52 (31)
Stroke	15 (9)
Atrial fibrillation	43 (26)
Discharge medication, n (%) prescribed:	
ACE inhibitors	136 (81.9)
Beta-blockers	63 (38.0)

Table 2

*New York Heart Association Classification at Time of Diagnosis and 6 Month Follow-up*

NYHA class, n (%)	Time of diagnosis	6 month follow-up
I	0	45 (27)
II	19 (11)	96 (58)
III	64 (39)	23 (14)
IV	83 (50)	2 (1)

Table 3

*Paired t-tests Comparing Baseline and 6 Month Scores*

Variable	Baseline		6 months		Statistics*
	Mean	SD	Mean	SD	
<b>Mood</b>					
Anxiety <sup>1</sup>	6.16	4.02	4.73	3.77	t(165df) = 4.96, p<.001
Depression <sup>1</sup>	4.69	3.18	4.37	3.24	t(165df) = 1.36, p=.177
<b>Quality of life</b>					
Physical <sup>2</sup>	20.57	11.31	11.97	10.23	t(165df) = 8.40, p<.001
Emotional <sup>3</sup>	9.03	6.86	4.97	5.79	t(165df) = 7.43, p<.001
Total score <sup>4</sup>	41.16	22.77	22.40	19.31	t(165df) = 9.68, p<.001
<b>Illness beliefs</b>					
Identity <sup>5</sup>	9.14	4.21	8.01	4.40	t(165df) = 3.12, p=.001
Consequences <sup>6</sup>	3.08	.59	3.00	.67	t(165df) = 1.75, p=.081
Cure/control <sup>7</sup>	3.67	.58	3.42	.59	t(165df) = 4.88, p<.001
Timeline <sup>8</sup>	3.20	.88	3.61	.86	t(165df) = -5.42, p<.001
<b>Treatment beliefs</b>					
Treatment value <sup>9</sup>	4.17	.52	4.20	.55	t(165df) = -.63, p=.532
Concerns <sup>10</sup>	2.66	.76	2.36	.73	t(165df) = 4.61, p<.001
Cure <sup>11</sup>	3.13	.84	2.73	.83	t(165df) = 6.08, p<.001
Decision satisfaction <sup>12</sup>	4.06	.55	4.07	.56	t(165df) = -.01, p=.989

\* If a Bonferroni correction is applied to take account of 13 t-tests being performed, ( $0.05/13 = 0.004$ ),

a p value < 0.004 is considered statistically significant.

<sup>1</sup>Scale 0-21, higher score = greater depression/anxiety

<sup>2</sup>Scale 0-40, higher score = poorer physical quality of life

<sup>3</sup>Scale 0-25, higher score = poorer emotional of life

<sup>4</sup>Scale 0-105, higher score = poorer quality of life

<sup>5</sup>Scale 0-19, higher score = more reported symptoms, which are attributed to HF

<sup>6</sup>Scale 1-5, higher score = more serious perceived consequences

<sup>7</sup>Scale 1-5, higher score = stronger belief that HF is amenable to control/cure

<sup>8</sup>Scale 1-5, higher score = longer perceived disease timeline

<sup>9</sup>Scale 1-5, higher score = stronger belief in value of treatment

<sup>10</sup>Scale 1-5, higher score = more concerns about treatment

<sup>11</sup>Scale 1-5, higher score = stronger belief in curative ability of treatment

<sup>12</sup>Scale 1-5, higher score = greater satisfaction with treatment decisions



Table 4

*Stepwise Regression Analysis. Baseline Predictors of Change in Quality of Life.*

Variables	B	t	Adjusted R <sup>2</sup>	Δ adjusted R <sup>2</sup>	Power 1 – β
DV = Change in MLHF total score <sup>1</sup>					.99
Step 1			.040	.040	
Step 2			.058	.018	
Step 3			.113	.055	
COPD	.178	<b>2.410*</b>			
Hypertension	.143	<b>1.948*</b>			
IPQ Consequences	.246	<b>3.331***</b>			
DV = Change in MLHF physical subscale <sup>2</sup>					.99
Step 1			.043	.043	
Step 2			.064	.021	
Step 3			.090	.026	
Step 4			.116	.026	
COPD	.170	<b>2.288*</b>			

Hypertension	.151	<b>2.064*</b>		
IPQ consequences	.104	1.301		
Anxiety	.192	<b>2.389*</b>		
DV = Change in MLHF emotional subscale <sup>3</sup>				1.00
Step 1			.030	.030
Step 2			.085	.055
Step 3			.108	.023
Step 4			.139	.031
Age	-.157	<b>-2.051*</b>		
COPD	.215	<b>2.943**</b>		
Hypertension	.153	<b>2.098*</b>		
IPQ consequences	.199	<b>2.601**</b>		

*Note.* Only  $\beta$  and t values from the final step of the equations are shown.

<sup>1</sup>Step 1: COPD, Step 2: COPD, Hypertension.

<sup>2</sup>Step 1: COPD, Step 2: COPD, Hypertension, Step 3: COPD, Hypertension, IPQ consequences.

<sup>3</sup>Step 1: Age, Step 2: Age, COPD, Step 3: Age, COPD, Hypertension.

\* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\*  $p \leq .001$

Table 5

*Stepwise Regression Analysis. Influence of Change in Symptoms and Beliefs on Change in Mood*

Variables	$\beta$	T	Adjusted R <sup>2</sup>	$\Delta$ adjusted R <sup>2</sup>	Power $1 - \beta$
DV = Anxiety <sup>1</sup>					1.00
Step 1			.041	.041	
Step 2			.241	.200	
Step 3			.324	.083	
Step 4			.358	.034	
Step 5			.387	.029	
Hypertension	-.111	-1.753			
TRI concerns	.290	<b>4.308***</b>			
IPQ identity	.329	<b>4.880***</b>			
IPQ cure	.207	<b>3.365***</b>			
IPQ consequences	.190	<b>2.907**</b>			
DV = Depression <sup>2</sup>					1.00
Step 1			.131	.131	

Step 2			.188	.057
Step 3			.222	.034
Step 4			.237	.015
NYHA	.236	<b>3.232***</b>		
IPQ identity	.227	<b>3.126**</b>		
IPQ consequences	.194	<b>2.746**</b>		
TRI cure	-.143	<b>-2.065*</b>		

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<sup>1</sup>Step 1: Hypertension, Step 2: Hypertension, TRI emotion, Step 3: Hypertension, TRI emotion, IPQ identity, Step 4: Hypertension, TRI emotion, IPQ identity, IPQ cure.

<sup>2</sup>Step 1: NYHA, Step 2: NYHA, IPQ identity, Step 3: NYHA, IPQ identity, IPQ consequences.

\*p≤.05, \*\* p≤.01, \*\*\* p≤.001

Table 6

*Stepwise Regression Analysis. Relationship between Change in Symptoms, Beliefs and Mood and Change in Quality of Life*

Variables	$\beta$	T	Adjusted R <sup>2</sup>	$\Delta$ adjusted R <sup>2</sup>	Power $1 - \beta$
DV = Change in MLHF total score <sup>1</sup>					1.00
Step 1			.040	.040	
Step 2			.058	.018	
Step 3			.247	.189	
Step 4			.369	.122	
Step 5			.438	.069	
Step 6			.472	.034	
COPD	-.121	<b>2.123*</b>			
Hypertension	-.015	.260			
NYHA	.243	<b>3.881***</b>			
IPQ identity	.285	<b>4.500***</b>			
IPQ consequences	.233	<b>3.873***</b>			
Depression	.219	<b>3.380***</b>			

DV = Change in MLHF physical subscale <sup>2</sup>				1.00
Step 1			.043	.043
Step 2			.064	.021
Step 3			.325	.261
Step 4			.436	.111
Step 5			.471	.035
Step 6			.494	.023
COPD	-.126	<b>2.248*</b>		
Hypertension	-.024	.414		
NYHA	.342	<b>5.576***</b>		
IPQ identity	.291	<b>4.686***</b>		
IPQ consequences	.163	<b>2.772**</b>		
Depression	.181	<b>2.853**</b>		
DV = Change in MLHF emotional subscale <sup>3</sup>				1.00
Step 1			.030	.030
Step 2			.085	.055

Step 3			.108	.023
Step 4			.215	.107
Step 5			.319	.104
Step 6			.332	.013
Step 7			.378	.046
Step 8			.399	.021
Age	-.309	<b>-4.762***</b>		
COPD	-.158	<b>2.582**</b>		
Hypertension	-.043	.686		
NYHA	.191	<b>2.714**</b>		
IPQ identity	.203	<b>2.804**</b>		
IPQ consequences	.043	.643		
Anxiety	.217	<b>2.934**</b>		
Depression	.183	<b>2.572**</b>		

<sup>†</sup> Step 1: COPD, Step 2: COPD, Hypertension, Step 3: COPD, Hypertension, NYHA, Step 4: COPD, Hypertension, NYHA, IPQ identity, Step 5: COPD, Hypertension, NYHA, IPQ identity, IPQ consequences.

<sup>2</sup> Step 1: COPD, Step 2: COPD, Hypertension, Step 3: COPD, Hypertension, NYHA, Step 4: COPD, Hypertension, NYHA, IPQ identity, Step 5: COPD, Hypertension, NYHA, IPQ identity, IPQ consequences.

<sup>3</sup> Step 1: Age, Step 2: Age, COPD, Step 3: Age, COPD, Hypertension, Step 4: Age, COPD, Hypertension, NYHA, Step 5: Age, COPD, Hypertension, NYHA, IPQ identity, Step 6: Age, COPD, Hypertension, NYHA, IPQ identity, IPQ consequences, Step 7: Age, COPD, Hypertension, NYHA, IPQ identity, IPQ consequences, Anxiety.

\* $p \leq .05$ , \*\*  $p \leq .01$ , \*\*\*  $p \leq .001$



Figure 1  
*Percentage of Patients Reporting Symptoms that they Attributed to HF (IPQ Identity)*

