Congestive heart failure (CHF) is the end stage of many diseases of the heart and a major cause of morbidity and mortality. The incidence of CHF is increasing steadily as treatment for its coronary antecedents, such as myocardial infarction, advances. Treatment of CHF generally relies on a battery of pharmacological interventions, alongside exercise and diet regimens. It is only in recent years that the psychological impact of heart failure has been explored, which is reflected by the absence of standardized psychological assessment for patients with CHF. In this article, we review studies that have addressed the effects of depression, anxiety, coping style, and level of social support in CHF. From the available evidence, it appears that patients generally experience moderate levels of depression, but not greatly heightened anxiety. Level of social support and style of coping with the disease are, however, important prognostic factors. It is difficult to draw definitive conclusions owing to the paucity of literature. Further work examining this issue is needed if the psychological issues of heart failure are not to be neglected.

Heart failure is the end stage of many diseases of the heart and is a major cause of morbidity and mortality. Present estimates suggest that approximately 5% of all hospital ward admissions are accounted for by heart failure, and this percentage is expected to increase over the coming years. This is the result of both an aging population and therapeutic advances that have led to increasing numbers of people surviving acute myocardial infarction (MI).

Despite therapeutic advances in the pharmacological management of heart failure, the 1-year mortality rate for patients with advanced heart failure still approaches 40%, which is the same for many of the more aggressive cancers. Even those with less serious heart failure who can live for many years often experience considerably impaired quality of life. Given the high mortality and morbidity associated with heart failure, it is not surprising that patients typically report psychological distress, reduced social functioning, and diminished quality of life. Quality of life is increasingly recognized as an important factor when studying the effects of interventions. Furthermore, psychological factors have also been implicated in precipitating hospitalization in a notable number of patients with congestive heart failure (CHF). It has previously been shown that emotional events (such as violent arguments or threatened separation from family members) preceded admission in 49% of patients with CHF compared with 24% of patients admitted with other medical conditions.

The impact of psychological factors on cardiac function has been studied extensively in the areas of coronary artery disease and acute MI. Debates over the relationship between type A behavior and coronary artery disease have been raging for over 30 years. Recently, depression and anxiety following MI have become increasingly recognized and are now the target of many psychoeducational programs. For example, Dusseldorp et al conducted a meta-analysis of psychoeducational programs for patients with coronary heart disease, and these programs...
yielded a 34% reduction in mortality, a 29% reduction in recurrence of MI, and notably contributed to better exercise and dietary habits.

Despite the difficulties of living with heart failure and the apparent success of psychoeducational programs following MI, it is only recently that clinicians have begun to pay greater attention to the psychosocial issues of CHF. Some authors now suggest that paying greater attention to the psychological correlates of chronic illness may pay dividends in terms of reduced number of hospitalizations by reducing the number of repeated hospitalizations if morbidity and mortality were influenced by psychological health.8 This review article examines studies that explore the links between psychological factors such as depression, anxiety, social support and coping styles, and physical health of patients with CHF.

SEARCH STRATEGY

Articles for inclusion in this review (1965-2000) were identified through searching for the terms congestive heart failure, depression, anxiety, social support, and coping styles and psychology on the electronic databases MEDLINE, EMBASE, and PsychLit. Further articles were identified through examination of references lists from articles to ensure that all relevant studies were included.

Article Inclusion and Exclusion Criteria

Articles were included in this review if they concerned adult (age ≥18 years) patients with heart failure due to any underlying cause and addressed issues of depression, anxiety and/or social support. Those articles in which disease comorbidity was insufficiently distinguished in analyses and in which other factors (such as impending surgery) were an issue were excluded from this review.

A total of 23 studies were retrieved; however, 11 of the retrieved studies did not meet criteria for inclusion in the review. This was mainly because of a lack of differentiation between heart failure patients among a general cardiac group (6 studies); the use of patients scheduled to have heart transplantation, for whom the prospect of major surgery would be expected to have an effect on psychological variables (3 studies); or insufficient measures of psychological variables (eg, taking marital status as an indicator of social support without further questioning as to whether this was a true source of support) (2 studies).

The 2 reviewers independently selected suitable studies for inclusion in this review. If any disagreements occurred between the 2 reviewers, recourse to a third reviewer was to be made. The data abstracted from each article related to the complexities of the topic area and included patient demographics, cardiological status, measurement instruments (eg, depression or anxiety inventories), as well as data relating to study eligibility, quality, and outcomes.

Study Quality Criteria

Study quality was graded according to design as follows:

Ia: Prospective longitudinal study with sufficient patient number, well-matched groups, and well-validated measurement instruments.

Ib: Prospective longitudinal study with low patient number, but with well-matched groups and well-validated measurement instruments.

IIa: Cross-sectional study with sufficient patient number, well-matched groups, and well-validated measurement instruments.

IIb: Cross-sectional study with low patient number, but with well-matched groups and well-validated measurement instruments.

IIla: Prospective, longitudinal study with sufficient patient number, but with poorly matched groups and/or less well-validated measurement instruments.

IIlb: Prospective, longitudinal study with low patient number, poorly matched groups, and/or less well-validated measurement instruments.

PSYCHOSOCIAL FACTORS IN HEART FAILURE

Depression

Arguably the most frequently explored topic in cardiac psychology is that of depression.9 Recent years have seen a plethora of studies examining the relationship between depression and MI10,11; not surprisingly, the prevalence of depression among MI survivors is higher than that of the healthy population.12 However, some authors also claim that depression in itself, independent of other factors such as age, severity of infarct, or sex, is a risk factor for further cardiac events and eventual mortality.13-15

Besides predicting cardiac events and affecting mortality, it is possible that depression may contribute to the high readmission rates for patients with CHF.16,17 Major depression is associated with noncompliance with medical treatment in younger, chronically ill, disabled patients18 and in elderly cardiac patients19-21; thus, it is possible that noncompliance with treatment regimes may be a major factor precipitating readmission for CHF.22

One difficulty that emerges when comparing studies is the variety of self-report and interview measures used to assess levels of depression. Numerous questionnaires have been developed, such as the Beck Depression Inventory,23 the Center for Epidemiological Studies–Depression Scale (CES-D),24 the depression scale of the DSM-III-R or DSM-IV; the Hospital Anxiety and Depression Scale;25 and the Zung Self-Rating Depression Scale.26 In general, all of these measures are accepted as being suitable means of assessing depression, with satisfac-
tory levels of validity and reliability. However, something that is rarely noted is the inclusion of somatic depression symptoms of fatigue and insomnia within the diagnostic criteria for depression. While these are symptoms of depressive state, they are also primary symptoms of CHF. It appears that only 1 published study overcomes this problem by analyzing the data both with and without these criteria. Thus, any of the more marginal findings of depression may need to be treated with some caution.

Anxiety
Despite the fact that anxiety is a condition that frequently presents comorbidly with depression, there is a paucity of literature on anxiety among individuals with heart failure. Anxiety over the poor prognosis of heart failure makes it seem probable that this will be a serious difficulty, both for patients and for their caregivers. However, the lack of information in this area makes it impossible to confirm such a hypothesis. Anxiety should be of relevance to clinicians because it can negatively affect the cardiac output of patients with CHF. Stress can cause an increase in heart rate, which has a negative effect on coronary artery perfusion through shorter diastole. Tachycardia reduces myocardial oxygen supply, while increasing myocardial oxygen demand. This can be a spiraling process, with patients becoming increasingly concerned about their physical state, which feeds back into increased anxiety and even poorer cardiac output. Concerns about physical capability and anxiety over taking part in physical activities may also hamper rehabilitation attempts.

The Role of Social Support
Measuring depression and anxiety in patients with CHF provides an insight into the general psychological status of patients and may also suggest areas in which resources should be deployed. However, the impact of these may be mediated by the level of social support experienced by the patient. Social support has been shown on numerous occasions to be a protective influence against adverse events, and CHF may be a condition in which it is also of importance.

Coping Styles
It is also well documented that the manner in which individuals cope with negative or stressful life events affects their physical and psychological well-being. Some authors suggest that coping strategies mediate between stressful events and such consequences as depression and anxiety. Chronic and debilitating illnesses (such as CHF) may lead to stress, and the patient may turn to a variety of strategies to cope with this stress. Coping may be defined as cognitive or behavioral attempts to either avoid a stressful situation or actively do something to alter the situation. Coping styles are generally defined as the repeated way in which the individual responds to stressful encounters.

CROSS-SECTIONAL STUDIES OF DEPRESSION IN HEART FAILURE
Zuccala et al reported a study of 53 patients admitted with heart failure and screened for depression with the CES-D. Severe depressive symptoms were present among 85% of patients; however, no follow-up was made with patients to examine the longer-term impact of this finding. Depressive symptoms were also shown to relate to poorer perception of health status and reduced functional ability, although interestingly, no correlation between left-ventricular ejection fraction and depression was present. Higher CES-D scores also positively correlated with cortisol levels and negatively correlated with sodium levels and blood lymphocyte count. The lack of a correlation between depression and the objective measure of the left ventricular ejection fraction suggests that depression may limit social or physical activity independent of whether the individual’s health is a limiting factor. Furthermore, the correlation between cortisol level and lymphocyte count suggests that some of the possible adverse effects of depression on health status in patients with CHF may be due to neuroendocrine and immune dysfunction rather than directly left ventricular dysfunction or pulmonary obstruction.

Majani et al studied 152 non-demented men 70 years or younger with a New York Heart Association (NYHA) class of III or lower. Levels of depression were assessed through the Cognitive Behavioral Assessment 2.0 Depression Scale, part of an Italian battery of cognitive and psychosocial measures. Comparisons were made between normative group scores for healthy individuals (matched for age and sex) and the heart failure patients in the study. Because of the low numbers in several of the age groups, comparisons were only made in the second age class (41-60 years [n=114]). In this group, patients showed considerably greater levels of depression than their healthy counterparts.

The findings of Zuccala et al and Majani et al are backed up by those of Havranek et al, who also found that patients with CHF scored significantly higher on depression assessments than matched control subjects. Havranek et al suggest that identifying and treating depressed patients with CHF may considerably improve levels of functioning in these patients, and, consequently, this may lead to greater adherence to rehabilitation and medication regimen, which should result in an improvement in physical health status.

In contrast to the findings of the 3 studies above, Murberg et al did not find that levels of depression in their sample of patients with CHF differed from normative data. Murberg et al recruited 119 patients (85 men) with a mean age of 66 years and mean NYHA class 2.4 from an outpatient clinic. Of the patients, 60% scored within the normal range on the Zung Self-Rating Depression Scale, with only 2% exhibiting severe symptoms; none of these findings differ from what would be expected in a normal elderly community sample.

The lack of depressive effect among patients in this sample may be a reflection of the recruitment method.
used in this study. Attendees at an outpatient clinic received letters inviting them to participate in the study, thus resulting in a self-selecting, healthier, and younger population. Furthermore, it may be that those who did not volunteer for the study did not do so because they were experiencing depression or anxiety and did not want this exacerbated by answering questionnaires dealing with these issues. Thus, it is possible that this study may underestimate the prevalence of depression among outpatients with CHF.

Cross-sectional studies suggest that mild to moderate depression is prevalent across patients hospitalized with heart failure. This concurs with depression rates of between 30% and 60% in patients hospitalized with any severe illness, such as coronary heart disease, cancer, or stroke. However, Murberg et al, however, suggest that depression may not be nearly so prevalent in an outpatient population, although this is possibly a reflection of the relative youth and health of this group.

LONGITUDINAL STUDIES OF DEPRESSION IN HEART FAILURE

Freedland et al interviewed 60 patients with a mean NYHA class of 2.6 admitted with CHF, using a modified version of the Diagnostic Interview Schedule (DSM-III-R). Patients were then followed up at 3 and 12 months. Initially, 10 patients (17%) were found to have a major depressive disorder, even when questions regarding fatigue and insomnia (common symptoms of CHF) were discounted. Interestingly, only white patients were found to have depression; none of the black patients interviewed were diagnosed as having depression. When all patients were grouped together, the rate of major depression was still significantly higher in the CHF group than in the general, healthy, geriatric population.

After 1 year, a nonsignificant trend emerged toward higher mortality rates in the depressed (50% mortality) group than in the nondepressed (29% mortality) group. However, no control for severity of disease was made, and it should be noted that those in the depressed group were in slightly poorer health (NYHA class 2.6 vs 2.8). The lack of a significant effect is probably the result of a low sample size, but nonetheless, if disease severity were to be taken into account, it is possible that the effect would disappear.

Koenig compared depression in 107 patients admitted with CHF with 181 patients with other cardiac diseases or medical problems that were not of a cardiac nature; depression was assessed by the CES-D and Diagnostic Interview Schedule (DSM-III-R). Among patients with CHF, the rate of major depression was 36.5%, significantly higher than in the control group (25.5%). However, this difference was largely accounted for by low rates of major depression in cardiac patients without CHF. Furthermore, when severity of illness was taken into account, there was no longer a significant difference. Minor depression was identified in 21.5% of CHF patients; this did not differ significantly from the control population (17.0%).

Compared with nondepressed patients with CHF, depressed patients with CHF were significantly more likely to be readmitted as inpatients in the following 3 months. Depressed patients were also 50% more likely to die during the following year (29% vs 20%); however, this effect did not reach statistical significance, again probably due to the relatively low number of individuals who died during the 2 years of follow-up. However, when the effects of illness severity were controlled for, the effects of depression disappeared, and no statistical differences between the groups remained.

Krumholz et al examined 292 patients 65 years or older, who were hospitalized with heart failure. Depression was assessed using the CES-D. In the year following admission, 49% of the study sample experienced either cardiovascular death or rehospitalization, most commonly for heart failure (48% of the cases). In this case no link was seen between initial levels of depression and readmission or death in the following year.

Of the longitudinal studies conducted, possibly the most intriguing is that of Murberg et al who followed up the mortality of patients enrolled in their earlier study. Twenty patients died during the 24-month follow-up period, all from cardiac causes. Depressed mood was found to be a significant predictor of mortality, with 25% of depressed patients dying, whereas 11.3% of nondepressed patients died. Disease severity was controlled by measuring N-terminal fragment proatrial natriuretic factor (ProANF) 1-98 released into the bloodstream during an atrial stretch, such as that induced by CHF or increased pulmonary pressure. The ProANF 1-98 level correlates with status of disease, and is believed to be more reliable than the NYHA classification as a prognostic indicator in patients with CHF. Even when levels of ProANF, sex, and age were statistically controlled for, depressed mood still emerged as an independent predictor of mortality.

The study by Murberg et al is particularly interesting because it is the first sufficiently controlled study to indicate a link between depression and mortality in CHF. In other studies in which severely ill inpatients are recruited, depression may not be important as a factor in subsequent mortality and morbidity to emerge as an independent risk factor; subsequent health is decided almost entirely by the physical state of the patient. However, in the outpatient population tested by Murberg et al, the relative physical health of the patients may have been better, and thus depression may play a larger role in physical health.

Presently, the link between depression and mortality is unclear. Findings from studies of inpatients demonstrate that the more severe the level of disease, the greater will be the level of depression, although depression does not emerge as an independent risk factor. However, the findings in the study of outpatients by Murberg et al suggest that there may be some link between cardiac death and depression among those with heart failure, indicating that this topic surely deserves further attention. A summary of studies exam-
of a difference in degree of anxiety is impossible to tell whether the lack in patients with CHF is given in Table 1.

ANXIETY

Interestingly, in the only study to examine anxiety among patients with CHF,28 no significant differences in the degree of either state or trait anxiety (as measured by the Cognitive Behavioral Assessment 2.0 Depression Scale) were found between patients with CHF and those admitted with other illnesses. Patients with CHF were no higher in degree of “rumination” and reported less “fears and phobias” and “social anxiety.” However, a particular shortcoming in this study is that it does not report how many patients were actually aware of their diagnosis and their prognosis over the coming months or years. Furthermore, it is impossible to tell whether the lack of a difference in degree of anxiety is a reflection of patients’ acceptance or denial of their illness.8

The evidence from this study30 suggests that anxiety is not a significant difficulty for heart failure patients. However, any conclusions from this must be tempered by the observation that this study was conducted on an inpatient population, and, as seen in the depression literature, the psychological status of outpatients may differ notably. Again, further work examining the effects of anxiety on long-term health with various patient groups is necessary before any further conclusions can be drawn. A summary of studies examining anxiety, social support, or coping styles in patients with CHF is given in Table 2.

Krumholz et al37 determined whether emotional support was associated with fatal and nonfatal cardiovascular events in 292 elderly patients (mean age, 80 years). Patients were asked whether they could count on anyone to provide them with emotional support and, if so, to give the number of people to whom they could turn for support. Initial results suggested that emotional support was not significantly associated with clinical characteristics; however, in a 1-year follow-up study, lack of emotional support was significantly associated with risk of fatal and nonfatal cardiovascular outcomes. When adjustment was made for demographic and clinical factors, social ties and instrumental support, a lack of social support was still associated with a significantly higher risk of adverse events. However, a significant interaction between emotional support and sex was also found, with emotional support only appearing to be important for women, not for men.

Bennett et al3 assessed social support in 62 patients admitted with CHF, 23 of whom were rehospitalized in the
Table 2. Summary of Studies Examining Anxiety, Social Support, or Coping Styles in Patients With Congestive Heart Failure

<table>
<thead>
<tr>
<th>Study</th>
<th>Addressing</th>
<th>Type of Study</th>
<th>Study Quality†</th>
<th>Patients, No.</th>
<th>NYHA Class</th>
<th>Measure</th>
<th>Main Results</th>
<th>Study Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Majani et al, 1999</td>
<td>Anxiety</td>
<td>Cross-sectional</td>
<td>Ia</td>
<td>152 (all men)</td>
<td>III</td>
<td>CBA 2.0 state and trait</td>
<td>No significant differences in state or trait</td>
<td>Men only</td>
</tr>
<tr>
<td>Krumholz et al, 1998</td>
<td>Social support</td>
<td>1-y longitudinal</td>
<td>Ila</td>
<td>292 (126 men)</td>
<td>Not stated</td>
<td>Emotional support</td>
<td>Lack of emotional support increases risk of fatal and nonfatal events</td>
<td>Limited measure of social support</td>
</tr>
<tr>
<td>Bennett et al, 1997</td>
<td>Social support</td>
<td>6-mo longitudinal</td>
<td>Ib</td>
<td>62 (42 men)</td>
<td>Not stated</td>
<td>MOS Social Support Survey</td>
<td>No association between social support and readmittance</td>
<td>Short follow-up period; most patients had very good social support</td>
</tr>
<tr>
<td>Murberg and Bru, in press</td>
<td>Coping styles</td>
<td>2-y longitudinal</td>
<td>Ia</td>
<td>119 (85 men)</td>
<td>2.4</td>
<td>Brief COPE</td>
<td>Disengagement and denial linked to higher mortality</td>
<td>Self-selecting outpatient population</td>
</tr>
</tbody>
</table>

*NYHA indicates New York Heart Association; CBA 2.0, Congestive Behavioral Assessment 2.0 Depression Scale; and MOS, Medical Outcomes Study.
†Study quality scale: Ia, prospective longitudinal study with sufficient patient number, well-matched groups, and well-validated measurement instruments; Ib, prospective longitudinal study with low patient number, but with well-matched groups and well-validated measurement instruments; Ila, prospective longitudinal study with sufficient patient number, but with poorly matched groups and/or less well-validated measurement instruments.

6-month follow-up period. Social support was not shown to be a significant mediating factor within this cohort, although the results may have been skewed by the fact that 73% of the patients were married and, overall, patients believed that they had support all the time. Thus, in a more varied sample, an effect may be seen.

Presently, it is impossible to tell whether social support is vital to the patient with CHF. Literature from other areas of health study would suggest that it is, but until further research is conducted, a definitive answer cannot be given. To our knowledge, only 1 study examining the association between coping styles and mortality in patients with CHF is available. A total of 119 outpatients with a mean age of 66 years and mean NYHA class of 2.4 were recruited by written invitation and assessed on 6 subscales of the COPE dispositional inventory. Active coping, seeking instrumental support, seeking emotional support, acceptance, denial, and behavioral disengagement were measured. Following multivariate analysis, it was found that behavioral disengagement and lack of acceptance were significantly associated with mortality, even when disease severity (measured through ProANF levels), sex, and age were controlled for.

Psychological factors can influence biological functioning through several pathways. One possibility is that coping styles may influence the health behaviors of an individual; avoiding the reality of the illness may lead to reticence in adhering to physical and pharmacological treatment regimens. Patients may effectively deny the severity of their illness and thus not follow the prescribed treatments for the illness. A second possibility is that the effect on health is of a more direct nature. Numerous studies have demonstrated that when stress is uncontrollable for the individual, which may happen if it is not dealt with in an adaptive manner, increases in circulatory catecholamine levels occur, something that will affect both immune and cardiac function.

While it is difficult to determine the direction of causality between coping styles and health in patients with CHF, the existence of such an association should be of concern to clinicians in their treatment of such patients. Concentrating efforts on counseling patients in adaptive coping skills, making information on CHF more available, and ensuring that patients are fully aware of the necessity of their medications may help to ameliorate the prognosis for patients with CHF.

CONCLUSIONS

Until recently, the psychological correlates of heart failure have been somewhat neglected; however, recent years have seen an increasing level of interest in this area. While the evidence is, at present, inconclusive, studies that address the main issues of depression, anxiety, social support, and coping styles are beginning to emerge, and it is hoped that further work will enable a more definitive profile of the CHF patient to be produced.

The findings in the studies reviewed in this article give some indication that the prevalence of depression among those with CHF is relatively high; however, treatment through pharmacological means and consultation with mental health professionals seems relatively inadequate. Depression appears to be a fairly strong predictor of repeated admission, independent of initial severity of illness, which begs the question of whether suitable treatment for depression might prove cost-effective in the long run by reducing the rate of readmission. Furthermore, depression may even be an independent risk factor for mortality, something that should concern those involved in the treatment of patients. Tackling the reasons behind this depression through either medication or cognitive behavior therapy may bring improvements to the individual’s quality of life, reduce the number of hospital admissions, and even lower the rate of mortality.
Anxiety appears to be an overwhelmingly neglected area of study in heart failure. From the only available study to our knowledge, it seems that anxiety does not afflict the heart failure patient greatly; however, there are 3 possible explanations for this. First, it is impossible to generalize from a single study. Second, it is possible that patients were not aware of their diagnosis and the consequences of it. And third, patients may be accepting of their condition and thus may not be anxious for what the future holds. Without further evidence in this area it is impossible to tell.

The current research also hints that social support and coping styles may be important, independent factors in mortality and morbidity among patients. Availability of a large, supportive network and adoption of adaptive coping styles appear to be related to better physical health and quality of life. Guiding the mixture of coping styles used by an individual to a more positive direction is something that suits cognitive behavior therapy well. If coping styles are an important predictor of mortality, focusing attention on this area could be particularly beneficial to the patient.

It has been estimated that approximately 68% of all health care costs are associated with chronic illness and disability. The findings of the studies reported in this review article give some hint that a reliable psychosocial evaluation could be of benefit in improving the physical health of patients and thus reducing repeated admissions for decompensated heart failure. Such an evaluation would allow the identification of particular problems for the patient that might be addressed in the hope of improving the psychosocial functioning of the patient.

Presently, nonpharmacological interventions tend to focus on aspects of diet and medication regimen adherence that may improve prognosis, with only limited use of components addressing emotional factors. Findings in studies that have sought to use a component of psychological therapy to improve patient prognosis demonstrate greater physical improvement in patients than through pharmacological treatment alone. However, these studies do not address the question of whether a more focused, cognitive behavioral intervention examining patient attitudes and beliefs regarding their illness, medication, and diet would serve the interlinked purpose of improving both emotional and physical health of the patient. Such a program has been developed for patients with MI, but presently, no similar package is available for those with chronic heart failure.

The present lack of empirical evidence relating to psychological factors in the etiology and management of heart failure suggests that psychological factors are neglected in this condition. Further research would clarify the true picture regarding the general psychological status of patients and, if difficulties were identified, would afford the development of a standardized procedure for assessment and treatment of these difficulties. Because of the aging population and increasing incidence of this condition, it would seem prudent to invest more resources in the investigation and possible treatment of psychological factors in heart failure.

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