DEPRESSION IN CONGESTIVE HEART FAILURE PATIENTS:
IMPLICATIONS FOR THE ROLE OF THE ADVANCE PRACTICE NURSE

By

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To the Faculty of Washington State University:

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Congestive Heart Failure (CHF) affects approximately 5 million people in the United States of America, with an estimated 550,000 new cases diagnosed annually. CHF is the end result of many disease processes of the heart, and is a major cause of morbidity and mortality. CHF is a chronic, progressive condition that greatly restricts the patients’ daily activities and quality of life (Hunt et al., 2001). The prevalence of depression in the CHF population has begun to be explored in recent studies, and moderate levels of depressive disorders are seen in CHF patients. Routine depression screening and treatment in CHF patients will be enable advanced nurse practitioners to help their patients experience an improved quality of life, decrease hospital readmissions, and potentially impact patients’ long term mortality.
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Depression in Congestive Heart Failure: The Role of the Advanced Practice Nurse

Introduction

Heart failure is increasing in incidence and prevalence in the United States, as people with cardiovascular disease have improved survival after myocardial infarction due to advances in treatment. The number of CHF related deaths in the United States has increased six fold during the past forty years (Lloyd-Jones et al., 2003). The result is a large population of adults who are living with impaired functional status, debilitating physical symptoms, reduced social and role functioning, and a chronically complex and costly CHF medical regimen that must be followed to ensure further survival (Artinian, 2003).

A growing body of literature provides strong evidence that depression is linked to increased morbidity and mortality in patients with coronary heart disease and CHF (Thomas, Khatta, & Lann, 2003). CHF has a significant psychosocial impact on patients and their families. Psychological distress, diminished family role functioning, and debilitating physical symptoms lead to a decreased quality of life and the onset of depressive disorders, many of which are not diagnosed in the CHF patient population (MacMahon & Lip, 2002).

The majority of CHF patients are elderly, although there are many middle aged adults with CHF as well (Freedland & Carney, 2000). Approximately six to ten percent of people older than sixty-five years of age have CHF (Hunt et al., 2001). Eighty percent of patients hospitalized are more than sixty-five years old (Hunt et al.). Elderly patients often face different psychological challenges than younger patients. They may have a limited social support
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network, impaired physical functioning, or have negative life stress related to low socioeconomic status (Stuart-Shor, Buselli, & Carroll, 2003). Diagnosis and treatment of depression in elderly CHF patients requires specialized consideration, as the individual may present with impaired cognition or somatic complaints (Stuart-Shor, Buselli, & Carroll, 2003).

CHF clinical management guidelines recommend multiple diagnostic studies, the use of many pharmaceutical agents, a restrictive diet and prescribed exercise. However, there is an absence of recommended standardized psychological assessment screening for depression for patients diagnosed with CHF (Hunt et al., 2001).

A review of the literature by MacMahon and Lip (2002), describes the effects of depression on the morbidity and mortality of CHF patients. Results indicate it is important that primary care practitioners diagnose and treat the effects of depression in the CHF patient, as this intervention may prevent hospital readmission, improve level of functioning and quality of life, and decrease mortality in these patients (MacMahon & Lip, 2002). Advanced practice nurses, such as Family Nurse Practitioners (FNP), are educated to consider the psychosocial aspects of a chronic illness and how it affects the patient and the family. FNPs should routinely screen for depression in CHF patients, initiate treatment if indicated, and facilitate referral to the appropriate consultant for further assessment and development of a treatment plan (Artinian, 2003).

The purpose of this paper is to examine the relationship between depression and CHF, including the incidence of depression and CHF, and depression as a factor in determining the prognosis of an individual with CHF. In addition, the pathophysiology of depression and CHF
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will be explored as well as the treatment of these illnesses. Implications for FNP practice in caring for CHF patients will be discussed.

Depression and Congestive Heart Failure

Depression is a syndrome of psychological and physiological symptoms that are often chronic and recurrent in nature. The most common age for the onset of depression in the general population is between the ages twenty to forty, with women twice as likely to become depressed as men (Solnek & Seiter, 2002). Depression in people aged sixty-five years and older is a major health problem however, and causes suffering for many elderly people who go undiagnosed and untreated (Lebowitz et al., 1997). Elderly patients often have several chronic illnesses, social and economic problems. Health care professionals often conclude that depression is a normal consequence of these problems, allowing the illness to go untreated (Lebowitz et al.).

Depression is often a co-morbid condition with another chronic illness, such as CHF. It is particularly difficult to differentiate symptoms resulting from depression and those resulting from CHF in elderly persons (Lebowitz et al., 1997). Many elderly patients with CHF have pre-existing comorbid, neuropsychiatric conditions such as dementia and other forms of cognitive dysfunction. Additionally, CHF can cause symptoms that contribute to depression, such as impaired physical functioning, chronic sleep disturbance, memory impairment due to decreased cerebral blood flow, fatigue, and anxiety (Freedland & Carney, 2000).

Evangilista, Kawawa-Singer, and Dracup (2001) completed a qualitative study describing the health perceptions and psychosocial adjustment to illness of thirty two patients (fifty percent women, mean age fifty two years ± twelve years). These patients, who were treated in a heart failure clinic, described psychosocial stress, diminished health perception, lack of
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independence and control, and financial difficulties. The study also found that these patients were unable to work and thereby unable to earn an income. The study subjects were unable to fulfill family and societal roles, and had poor self-esteem and many social limitations. The subjects also described the uncertainty of their future as stressful. The responses of men and women reflected the complex psychological and physiological stressors associated with the syndrome of CHF (Evangilista et al.).

CHF patients who are at highest risk of developing depression have a pre-existing neuropsychiatric condition such as dementia or substance abuse (Lebowitz et al., 1997). Elderly men and women who have decreased social support, live alone, and have impaired physical functioning are at risk for developing depression (Stuart-Shor et al., 2003).

The diagnostic criteria for a major depressive episode are described in the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR, 2000). The classic symptoms of a major depressive disorder are depressed mood most of the day, anhedonia, significant weight loss or gain, insomnia or hypersomnia, psychomotor agitation or retardation, fatigue or loss of energy, feeling of worthlessness or guilt, impaired concentration or indecisiveness, and recurrent thoughts of death or suicide (Solnek & Seiter, 2002). DSM-IV-TR indicates major depression can be diagnosed when these symptoms occur for two weeks or more, and five of the symptoms are experienced every day (see Table 1). Clinically, individuals with major depression will have symptoms that affect their home and/or work life, and many even have thoughts of suicide (Williams, Noel, Cordes, Ramirez, & Pignone, 2002).

Minor depressions are levels of depression that can also be diagnosed when there are fewer than five of the previously mentioned depressive symptoms that last for at least two weeks.
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(DSM-IV-TR, 2000). In the elderly age group minor depressive episodes are associated with increased risk of major depression, physical disability, medical illness, and high use of medical resources (Lebowitz et al., 1997). (See Table 1).

Dysthymia is a chronic condition and two of the classic depressive symptoms should be present for two years or longer to meet diagnostic criteria (DSM-IV-TR, 2000). The patient with dysthymia may be experiencing hypersomnia, fatigue, low self-esteem, hopelessness, and difficulty making decisions and concentrating (Solnek & Seiter, 2002). (See Table 1).

A diagnosis of depression in an elderly patient with CHF requires the FNP to take a complete medical history including history of the presenting illness. A physical exam, mental status exam, and assessment of social and family history are required. Laboratory testing including routine chemistries, complete blood count with differential, sedimentation rate, and thyroid function studies should be completed to rule out any physical or organic cause of the depressive symptoms (Ferri, 2003). Substance abuse, hypothyroidism, neurosyphilis, Cushing’s disease, malignancies, diabetes mellitus, autoimmune disorders, and medication side effects, as well as other psychiatric illness should be ruled out in order to make the diagnosis of depression (Solnek & Seiter, 2002; Williams et al., 2002).

Elderly, depressed patients presenting to the FNP will frequently present with physiologic complaints. There are many similarities to the symptoms of depression and the constitutional symptoms of CHF in elderly patients (Skotzko et al., 2000). Common complaints are related to fatigue, slowed thinking and responses, decreased short term memory, sleep disturbances with early morning awakening, feelings of pain, abdominal discomfort, headache, dizziness, chest pain or palpitations, and change in appetite resulting in weight loss or weight gain.
The patient may not describe feelings of despair and sadness, and may or may not describe active or passive suicidal ideation and delusional thinking (Solnek & Seiter 2002). Consultation by the FNP with a mental health professional such as a psychiatric nurse practitioner or psychiatrist should occur when a patient has been screened for and met the criteria for major depression, minor depression, or dysthymia without suicidal ideation (Guck, Elsasser, Kavan, & Barone, 2003).

FNPs also need to assess for suicide risk during the initial evaluation of a patient presenting with a differential diagnosis of clinical depression (Williams et al., 2002). Patients will rarely volunteer their thoughts of suicide and intentions so the practitioner must ask directly. Useful screening questions are “Have you been feeling that life is not worth living and that you would be better off dead?” Another approach is to say “Sometimes when a person feels down or depressed, they might think about dying. Have you had any thoughts like that?” (Williams et al. 2002, p. 1162). For patients that express thoughts of suicide, the next question is “Do you have a plan?” If the patient answers “yes”, then the FNP should inquire about the plan and take action to prevent the patient from leaving the clinic or carrying out the plan (Williams et al. 2002, p. 1162). Patients at high risk for suicide need to be immediately referred to a psychiatrist or hospital for emergent evaluation, ensuring the patient is not left unsupervised if suicidal ideation and planning have been expressed (Williams et al.).

Completed suicides are closely associated with major depressive illness, especially in the elderly (Lebowitz et al., 1997). The suicide rate for elderly white men, age eighty-five years and older, is six times the rate of the general population and remains a significant public health
concern (Lebowitz et al.). Physical illness has been proposed as a risk factor for late in life suicide, and data is being collected to support this conclusion (Lebowitz et al.).

There is strong evidence that links depression to increased morbidity and mortality in CHF patients with Coronary Artery Disease (CAD). CAD causes one half of all patients with CHF (Thomas et al., 2003). There have been great advances in CHF treatments in the last ten years, but the one-year mortality rate after diagnosis is about ten percent, increasing to fifty percent mortality five years after CHF diagnosis (Hunt et al., 2001). It is imperative that CHF be accurately diagnosed and treated in a patient who is also experiencing depressive symptoms (Thomas et al.).

CHF is defined as a clinical syndrome that is a result of a structural or functional cardiac disorder. The pathophysiological state is congestion of the pulmonary and systemic circulation as a result of the inability of the cardiac ventricles to either fill with or eject enough oxygenated blood to meet the metabolic needs of the body tissues (Hunt et al., 2001).

In 2001, the American Heart Association and The American College of Cardiology published a new approach to classification of CHF that describes the evolution and the progression of the disease (Hunt et al., 2001). Four stages of CHF have been identified (see Table 2). Stage A identifies the patients who have conditions that are strongly associated with the development of CHF, but have no identified abnormalities in the structure or function of the heart and are asymptomatic. Stage B identifies presence of structural heart disease that is strongly associated with the development of CHF, but patients remain asymptomatic. Stage C classification is for patients who have a history or current symptoms of CHF and have an
identified structural abnormality of the heart. The Stage D classification is used for patients with remarkable symptoms of CHF at rest and have advanced structural abnormalities of the heart. These patients require aggressive medical therapy and interventions to optimize cardiac function (Hunt et al.).

The New York Heart Association (NYHA) CHF classification system has been used for decades to quantify CHF based on the subjective report of the patient and practitioner observation (see Table 3). It attempts to define the symptoms that the CHF patient experiences and describes what provokes those symptoms. Hunt et al. (2001) states that the new classification system is not meant to replace the New York Heart Association classification system, but to complement it. In the NYHA CHF Classification system, functional classes range from I to IV. NYHA Class I patients have no functional limitations and NYHA Class II patients have slight limitation of physical activity, but are comfortable at rest. Class III patients have marked limitation of physical activity, and are comfortable at rest. Class IV patients are unable to carry out any physical activity without discomfort, and may even have symptoms such as fatigue, palpitations, dyspnea, or anginal pain at rest (Artinian, 2003).

Patients who are diagnosed with CHF will have a variety of complaints and symptoms depending upon which stage of the CHF clinical syndrome they are experiencing, and whether or not their heart failure involves the right ventricle, the left ventricle, or whether the patient has systolic or diastolic dysfunction (Connolly, 2000). Common clinical manifestations of CHF include shortness of breath or exertional dyspnea. This is a common symptom of left ventricular failure, and will progress to dyspnea with less strenuous activity, and orthopnea or shortness of breath while lying.
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in a recumbent position. Paroxysmal nocturnal dyspnea, awakening suddenly due shortness of breath, is also a common complaint (Connolly). Diminished cardiac output leads to decreased skeletal muscle perfusion and patient complaints of fatigue, lethargy, and overall weakness (Artinian, 2003). Patients say they can’t physically do what they formerly did in relation to activities of daily living, work related activities, or recreational activities (Hunt et al., 2001). Patients with CHF will complain of lack of stamina and need for frequent rest periods. Other common complaints are swelling in the ankles or stomach, cough, chest pain or pressure with exertion, nocturia, confusion, and memory impairment (Artinian).

Incidence of Depression and Congestive Heart Failure

Congestive heart failure is a major public health problem, affecting approximately five million Americans, with 550,000 new cases diagnosed annually. The incidence of CHF is increasing steadily as our population ages and treatments for coronary heart disease become more advanced (Hunt et al., 2001). CHF patient management accounts for twelve to fifteen million outpatient visits annually. The Heart Failure diagnosis-related group (DRG) is the most common among the Medicare population, and the largest Medicare expenditures are for the treatment of CHF (Hunt et al.). Annually in the United States, approximately $500 million are spent on drugs for the treatment of CHF (Hunt et al.). Currently, CHF has a significant impact on the health of American citizens and the United States health care system, and will continue to do so in the future. Lloyd-Jones et al. (2002), researchers with the long term Framingham Heart Study, published statistics indicating that Americans over forty years of age have a one in five lifetime chance of developing congestive heart failure. This is a grim statistic revealing that advanced practice nurses and other primary care practitioners have much work to do in
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preventing, identifying and treating those in our society who develop heart disease and subsequent CHF.

Depression research indicates three to five percent of the general population is affected by depression, and 15 percent of the primary care patient population have symptoms of a depressive disorder (Solnek & Seiter, 2002). While depression is a common condition seen in a primary care practice, it is underdiagnosed and undertreated by the majority of primary care practitioners (Solnek & Seiter).

CHF patients are at high risk for development of depression, and the literature indicates depression is a relatively common condition in persons with CHF. Incidence of depression rates in CHF patients are reported from thirteen to seventy seven percent. Men with CHF are more likely to become depressed than those in the general population (Thomas et al., 2003).

Jiang et al. (2001) studied the prevalence of depression and its relationship to outcomes in the CHF patient population. Three hundred and fifty seven patients who had NYHA Class II CHF or greater were screened with the Beck Depression Inventory (BDI), a twenty-one item, self administered questionnaire (Jiang et al.). Thirty five percent (n=126) of the 357 subjects had a BDI score ten or higher, and thus classified as depressed. A modified version of the Diagnostic Interview Schedule (DIS) was administered to determine which subjects of the 126 identified had major depression. One hundred of these eligible subjects completed the DIS interview. The final sample for analysis included 331 subjects of which 100 subjects were those who completed the DIS interview and 231 subjects were those with the BDI score less than ten. Of the 331 patients 13.9 percent (n=46) had a major depressive disorder. Fifty-four patients who
scored ten or higher on the BDI did not have a major depressive disorder, but were considered to have mild depression. The major depression group had a higher number of women that the mild depression group (Jiang et al.).

Freedland et al. (2003) recently published a large study of depression and CHF patients. Subjects were forty years and older, and DIS was utilized to screen for depression in six hundred and eighty two hospitalized CHF patients. Twenty percent of the subjects (n=136) met the criteria for a major depressive episode (as described in the DSM-IV-TR) and sixteen percent of the subjects (n=109) met the criteria for a minor depressive episode. Freedland et al. also found that fifty one percent (n=312) of six hundred and thirteen CHF patients who completed the Beck Depression Inventory II (BDI-II) were found to be depressed. The female CHF patients less than sixty years of age were more likely to suffer from major depression than those study subjects who were male and greater than sixty years old. The prevalence of major depression rose from eight percent in NYHA class I CHF subjects (n=25) to forty percent NYHA Class IV subjects (n=124) (Freedland et al.).

Depression as a Prognostic Factor In CHF

In patients with coronary heart disease, depression has been determined to be associated with poor outcomes, including recurrent myocardial infarctions, low functional status, and poor quality of life (Frasure-Smith, Lesperance, & Ginette, 2000). Researchers have established that the diagnosis of depression itself in a patient post myocardial infarction is an independent risk factor for further cardiac events and eventual mortality (Frasure-Smith et al.).

In a variety of heart failure studies, depression has been linked to several adverse CHF patient outcomes, such as rehospitalization, increased length of hospitalization, and increased
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mortality (MacMahon & Lip, 2002). These adverse outcomes are associated with noncompliance in taking prescribed medications, noncompliance with follow-up visits, dietary restrictions, and exercise programs (MacMahon & Lip).

Jiang et al. (2001) examined the relationships between depression, hospital readmission rates, and mortality rates in 331 patients hospitalized CHF patients (mean age sixty three years). Fourteen percent had major depression (n=46). Major depression was associated with a greater number of hospital readmissions at three months and one year follow-ups. CHF patients diagnosed with major depression also had twice the risk of dying (26.1%) within one year than those CHF patients without major depression (13.7%) (Jiang et al.).

Murberg, Bru, Aarsland, and Suebak (1998) completed a study to examine the prevalence of depression in CHF patients. One hundred nineteen clinically stable CHF outpatients were recruited and followed. Two subjects (1.7%) were classified NYHA CHF Class I, 59.7% were NYHA CHF Class II (n=71), 36.1% were NYHA CHF Class III (n=43), and 2.5% were NYHA CHF Class IV (n=3). Depression was measured using the Zung Self Rating Depression scale (SDS), a twenty item self-report instrument (Zung, 1965). Depression was diagnosed in thirteen percent of the patients with CHF (Murberg et al.).

Murberg, Brue, Svebak, Tveteras, and Aarsland (1999) conducted a two year follow-up study as part of the larger study, with partial results published in 1998. The goal of this research was to evaluate the relationship between depression, CHF disease specific symptoms, and mortality risk among patients with CHF. On hundred nineteen clinically stable CHF patients were recruited (71.4% men, mean age 65.7 ± 9.6 years). Twenty deaths (16.8%) occurred during the twenty-four month period of data collection, all from cardiac causes (Murberg et al.).
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Twenty five percent of the subjects with depressed mood died, whereas only 11.3% of non-depressed patients died within the twenty four month study period. Depressed mood was measured with the SDS. The CHF disease severity was sufficiently controlled in this study by measuring patient N-terminal fragment proatrial natriuretic factor (ProANF 1-98) released into the blood with high pulmonary pressures or excessive atrial stretch. The investigators felt this measurement was more accurate in defining CHF severity than the NYHA CHF classification scale. The analysis was controlled for age and sex of study subjects. Depressed mood emerged as an independent predictor of mortality (Murberg et al., 1999).

Koenig (1998) compared 107 hospitalized CHF patients, 106 patients with other cardiac diagnoses, and 129 patients who were hospitalized with non-cardiac medical conditions. The DIS, the Hamilton Depression Rating Scale, and the Center for Epidemiologic Studies Depressions Scale (CES-D) were administered to all subjects by a psychiatrist. The study found that 58% (n=62) of the CHF patient group had depressive symptoms and 22 (36.5%) subjects were diagnosed with major depression. This is significantly higher (p=0.002) than the 17% rate of major depression for the comparison group of cardiac patients without CHF (Koenig). There was not a significant difference between the comparison groups for the rate of minor depression. Depressed patients with CHF, when compared to non-depressed patients with CHF, were significantly more likely to be readmitted to the hospital in the three months following the initial testing (Koenig).

Koenig (1998) found that CHF patients with depression, when compared with CHF patients who were not depressed, were 50% more likely to die during the following year. However this was not statistically significant as there were low numbers of deaths, and when
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CHF illness severity was controlled for, the effects of depression disappeared between these two groups (Koenig). More than 40% of the depressed CHF patients remained depressed when screened at the one year follow-up assessment (Koenig). More than 40% of the depressed CHF patients remained depressed when screened at the one year follow-up assessment (Koenig).

Vaccarino, Stanislav, Kasl, Abramson, and Krumholz (2001) prospectively followed 391 patients fifty years of age or greater who met criteria for decompensated CHF upon hospital admission. To be eligible for the study patients were identified by radiologic signs of CHF, or had a hospital admission diagnosis of CHF. The patients were selected for inclusion into the study if they demonstrated one of the following symptoms: new onset or worsening of respiratory distress, chest pain consistent with myocardial ischemia, increased fatigue, and/or other manifestations of CHF such as confusion, syncope, or loss of consciousness. All subjects had at least one physical sign of CHF, e.g. S₃ gallop, peripheral edema, tachycardia, conduction disorders, pulmonary rales, hypotension, cardiogenic shock or arrest, or respirator rate greater than twenty four breaths per minute (Vaccarino et al., 2001). The outcome of the study was death or decline in activities of daily living (ADL) at six months compared to baseline (Vaccarino et al.). The sample was screened for depressive symptoms using the Geriatric Depression Scale Short Form, a 15 item self-report scale designed for older adults. Depressive symptoms were common in this sample of CHF patients, occurring in 77.5% of the CHF patients. Adjustments were made by the researchers for differences in demographic factors, medical history, baseline functional status, and CHF clinical severity. CHF patients with 11 or greater depressive symptoms, when compared to those with six or less depressive symptoms, had a 82% higher risk of either functional decline or death during the six month study period (Vaccarino et al.).
While this study was larger than previously studies, its size did not provide adequate statistical power to examine mortality as a separate endpoint (Vaccarino et al.).

Freedland et al. (2003) demonstrated that more severely ill CHF patients have a greater the prevalence of depression. Vaccarino et al. (2001) did not conclude that major depression is an independent risk factor for mortality in hospitalized CHF patients, but the results of Jiang et al. (2001), Koenig (1998) and Murberg et al. (1999) have strongly associated depression and increased mortality in CHF patients in hospital and outpatient settings (Thomas et al., 2003).

These study results indicate that the topic of depression in CHF deserves further exploration, with larger numbers of study participants representing a wide age range. The sampling needs to represent people who are diverse in ethnicity, have varied disease severity, and represent both genders. More controlled, longitudinal studies will provide further empiric evidence relating to the psychological factors contributing to the etiology and influencing the management of CHF. Further research will clarify the overall psychological status of CHF patients, and would provide further evidence to develop a standardized set of guidelines to assess and treat depression in CHF patients (MacMahon & Lip, 2002).

The Pathophysiology of Depression and Congestive Heart Failure

Neurohormonal pathways between depression and heart failure have not been specifically identified, and causality between the two conditions has not been proven. Indeed, the etiology of depression has not been specifically determined, but it is accepted by the medical community that depression has neurohormonal, environmental, and genetic factors that contribute to the development of the disease process (Musselman, Evans, & Nemroff, 1998).
Musselman et al. state that depressed people undergo imbalances in the neurochemical/neuroendocrine systems, as well as abnormalities of neuroanatomy, that not only lead to episodes of major depression, but to the development of heart disease.

The neurotransmitter serotonin is disturbed in depression, and this imbalance in serotonin may also play a role in coronary atherosclerosis. Vikenes, Farstad, and Nordrehaug (1999) state that serotonin imbalance may also promote thrombogenesis by activating platelets to be released, leading to platelet aggregation, a key component in the pathophysiology of coronary atherosclerosis and the progression to myocardial infarction.

People who are depressed are stressed individuals, and a result of the stress is excessive sympathetic and adrenergic activity within the neurohormonal system (Musselman et al., 1998). The hypothalamic-pituitary-adrenocortical (HPA) and sympathoadrenal systems are associated with depression and abnormal platelet reactivity (Musselman et al.). The HPA and sympathoadrenal systems are the two primary components of the stress response. The HPA stress response elevates levels of catecholamines, norepinephrine and epinephrine (Musselman et al.). The hypersecretion of these catecholamines in the plasma increase heart rate, increase myocardial oxygen consumption, and increase blood pressure via peripheral vasoconstriction (Musselman et al.). Increased catecholamines in depressed CHF patients lead to increased platelet activation and aggregation, potentially contributing to thrombus formation, myocardial infarction and stroke (Musselman et al.). There are multiple mechanisms in the neurohormonal system that leads to altered platelet activation and aggregation. It is hypothesized that this may be the neurohormonal link between depression and increased morbidity and mortality in those with CHF (Musselman et al.).
Another theoretical pathophysiological link between depression and heart failure is the stimulation of the HPA system, thus initiating a series of neurohormonal responses that ultimately release corticosteroids in the blood stream (Musselman et al., 1998). This activation leads to release of cortisol in the blood stream, a glucocorticoid. Corticosteroids are known to cause hyperglycemia, and promote hypercholesterolemia, hypertriglyceridemia, and hypertension. All of these conditions have been demonstrated to be high risk factors for the development of thrombus, which leads to stroke, myocardial infarction and subsequent CHF (Musselman et al.).

Danner, Kasl, Abramson, and Vaccarino (2003) have identified that C-reactive protein (CRP), a marker of inflammation, is elevated in depressed individuals. Presence of CRP has been shown previously to be predictive of cardiovascular disease, and has been identified as a risk factor for the development of atherosclerosis (Ridker, 2003).

Pasic, Levy, and Sullivan (2003) have demonstrated that depression is accompanied by an immune response, thereby promoting the production of pro-inflammatory proteins and cytokines. The cytokine interleukin-6 has been shown to be a significant predictor of death in those with CHF (Pasic et al.). Cytokines are mediators in the inflammatory process, and overproduction of cytokines contribute to the progression of CHF to advanced stages. Pasic et al. have reported that the presence of interleukin-6 in depression and CHF are independent, but that the natural course of the disease for those with CHF and depression is worse in part related to interleukin-6 cytokine activation.

The impaired cardiac pumping and resultant congestion in congestive heart failure is caused by many pathophysiological conditions, and presents itself in a variety of different ways.
reflecting stages of severity. The body attempts to correct the inefficient pumping of the heart, as well as regulate excess fluid in the cardiovascular system, by activating the sympathetic nervous system, the renin-angiotensin-aldosterone system (RAAS) and the immune system. Natriuretic peptides are released to counteract the RAAS activation. In addition, the body responds to myocardial injury and cell death by activating the immune system, which releases pro-inflammatory cytokines such as tumor necrosis factor alpha, interleukin-1, and interleukin-6 (Blum, 1998).

These pathophysiologic links between depression and CHF have been clinically described, however no definitive research results indicative of causality have been reported. Research is ongoing to further describe and identify these processes in an effort to help the millions that suffer from depression and CHF.

*Treatment of Depression and Congestive Heart Failure*

The possibility of increased morbidity and mortality in patients with depression and CHF reveals the importance of advanced practice nurses and primary care practitioners to assess for depression in the CHF patient, and to address the psychosocial aspects of a life experienced with chronic heart failure (Thomas et al., 2003). FNPs prescribe a multifaceted approach to treatment, assessing the level of social support, emphasizing patient and family education and teaching importance of compliance with the medical regimen. FNPs assess the psychosocial aspects of a patient’s life, and teach him or her to take an active role in managing this chronic disease process (Flechter & Thomas, 2001). FNPs screen for depression, and make appropriate referrals to consultants for confirmation of diagnosis and treatment. FNPs will follow up in the
Assessing for the presence of depression in the CHF patient is the beginning of this process. CHF patients should be assessed for depression using one of the self-reporting instruments, such as the Geriatric Depression Inventory, BDI-II, CES-D, or Zung Self-rating depression scale (Artinian, 2003). All tools are written at third to fifth grade reading levels and can be used to assess for the presence of depressive symptoms and monitor the response to treatment over time (Artinian). The Geriatric Depression Inventory takes into account the special considerations of older individuals, has thirty self-report items in yes/no format, and is used for adults older than fifty-five (Guck et al., 2003). BDI-II is a twenty-one item, self-report scale, in multiple choice format. CES-D is a twenty item self-report Likert scale, and the Zung Self-Rating Depression Scale is a twenty item self-report Likert scale (Guck et al.). All instruments are reliable and valid depression screening tools. These depression screening tools are sensitive to changes in depression and are therefore useful in the treatment and monitoring of CHF patients (Guck et al.).

According to Guck et al. (2003), the greatest risk associated with screening CHF patients for depression is the possibility of false-positive results, which can lead to unnecessary referrals to mental health professionals, additional diagnostic tests, and possibly initiation of anti-depressant medications inappropriately. Guck et al. recommend that patients with positive depression assessment scores be interviewed more extensively prior to determining and implementing a treatment plan.
FNPs need to educate the CHF patient and family that depression is a common, treatable condition and that there are several approaches to treatment utilizing pharmacologic agents, psychotherapy, cardiac rehabilitation, and psychosocial interventions. Pharmacologic therapy utilizing the selective serotonin reuptake inhibitors (SSRI’s) is considered first line therapy for CHF patients diagnosed with depression (Guck et al., 2003). Tricyclic antidepressants (TCA’s), and atypicals such as bupropion, vanlafaxine, trazadone, or mirtazapine are recommended for CHF patients who are diagnosed with depression as well (Guck et al.). MAOI inhibitors are used primarily in patients who have not responded to other classes of anti-depressants or electroconvulsant therapy and are not prescribed by FNPs (Solnek & Seiter, 2002).

Patients who meet criteria for major depressive disorder should receive pharmacologic therapy, as should those who may not meet criteria but whose depression has lasted a month and is interfering with family work, or school (Uphold & Graham, 2003). The two classes of drugs most commonly used are the SSRI’s and TCA’s. The SSRI’s appear to be safe in patients with advanced cardiovascular disease (Roose, 2000). TCA’s are to be used with caution in those with advanced cardiovascular disease, as they have been reported to produce adverse cardiovascular effects such as orthostatic hypotension, elevated heart rate, and cardiac conduction delays (Roose, 2000). The elderly tend to tolerate the SSRI’s better than the TCA’s. SSRI’s have fewer anticholinergic effects, little or no adverse effects on cognition at recommended doses, and minimal cardiovascular effects (Lebowitz et al., 1997).

The patient’s clinical presentation should be evaluated and previous trials of antidepressant medications and the patient’s CHF symptomatology should be taken into consideration when considering a prescription for an anti-depressant drug. Drug side effect
Depression in CHF Patients

profile and anticipated drug effects should also be reviewed. In addition, drug-drug interactions, administration schedule, and the cost of the antidepressant are factors to consider when prescribing antidepressants for CHF patients (Roose, 2000). CHF patients often take warfarin, a commonly prescribed anticoagulant. It has been reported that fluoxetine, paroxetine, and sertraline can interact with warfarin and elevate the prothrombin time further than if the patient was taking warfarin alone. This drug-drug interaction needs to be identified and planned for prior to the CHF patient starting an antidepressant (Guck et al., 2003).

Depression and anxiety frequently occur together (Artinian, 2003). Pharmaceuticals that are commonly used to treat anxiety such as lorazepam, oxazepam, and diazepam, are acceptable to be prescribed to patients with congestive heart failure. Benzodiazepines have no cardiac side effects, but are metabolized in the liver so the CHF patient that has liver congestion may require lower doses, and needs to realize the drug effects will be longer lasting. The side effect profile of benzodiazepines can be unacceptable in elderly patients with CHF. Memory and psychomotor impairment, sedation, and fatigue may increase the risk of falls and promote forgetfulness when taking CHF medications as prescribed. SSRI’s can also be used to treat generalized anxiety in addition to depression, and may be a better choice for elderly CHF patients (Artinian).

It is also very important that the health care provider consider the needs of the patient within the context of the family. Mahoney (2001) used an ethnographic approach to understand the illness experiences of patients with CHF and their family members. Mahoney states that patients and their family members experience a process of disruption, incoherence and reconciling as they struggle to cope with the CHF disease process. The findings of the study describe the importance of nurses and other providers understanding the struggles experienced
by the patient and family, and also understand how the patient and family record information about their CHF illness and how they use the information to modify their treatment regimen (Mahoney).

Psychosocial and psychotherapeutic interventions for the treatment of depression should be included in the treatment plan for the CHF patient with a depressive disorder. These nonpharmacologic interventions help patients cope with the chronic nature of their heart disease, and can teach them strategies and other skills to monitor their condition and work with their provider to avoid CHF exacerbations, and have an improved quality of life. Patients with heart failure often need help complying with the complex CHF treatment plan that is often prescribed. They are asked to take multiple medications many times a day, monitor daily weights and blood pressures, monitor themselves for increased CHF symptoms indicating worsening of their condition, and make and keep provider appointments for clinic visits and blood draws (Artinian, 2003). Many CHF patients experience cognitive impairments due to diminished cardiac flow to the brain, and if the psychomotor retardation seen in depression is added, the CHF patient will exhibit difficulty concentrating, making decisions, or remembering to take medications and keep appointments (Artinian).

Other non-pharmacologic approaches to treatment of depression in CHF patients are biofeedback and relaxation training. Moser (1999) conducted a randomized, controlled study where ninety CHF patients were assigned to either standard CHF medical care group, or a group where they received biofeedback and relaxation training in addition to standard CHF medical care. The patients in the biofeedback relaxation group experienced a forty-five percent decrease in anxiety and twenty-five percent decrease in depression when compared to the
group that received standard CHF care alone (Moser). Smoking cessation assistance, guided imagery and other stress management techniques have also been recommended to heart failure patients by advanced practice nurses to help them learn how their bodies can cope with external and internal stressors that living with chronic heart failure can bring (Moser).

Cognitive behavior therapy is a structured psychotherapeutic approach to managing depression, and among the existing forms of psychotherapy it is the approach supported by clinical evidence (Guck et al., 2003). The goal of cognitive therapy is to train the patient to solve problems and modify dysfunctional thinking and behaviors. The patient is trained to modify his or her interpretation of the stressful situations, and attempt to seek new and different meanings for them. The patients are then instructed to formulate alternative ways to view a situation and then take appropriate action to resolve the problem (Guck et al.).

Dunbar and Summerville (1997) state that cognitive therapy is an appropriate nursing intervention for cardiac patients. Cognitive therapy is short term, goal oriented, emotionally supportive, interactive, and can address specific fears or symptoms through the use of desensitization. Specific goals for cardiac patients are identified and positive patient controlled aspects of recovery, such as diet and exercise, are focused on. Overall, cardiac patients are reported to be generally accepting of cognitive behavioral therapy as an adjunctive and/or alternative treatment to pharmacologic management of depression (Dunbar & Summerville).

Rehabilitative exercise has been shown to reduce the severity of CHF symptoms and improve exercise tolerance and functional capacity. Physical activity also promotes improved sense of well being, and has been shown to decrease depression and anxiety in CHF patients (Kostis, Rosen, Cosgrove, Shindler, & Wilson, 1994).
Successful treatment of depression in CHF patients requires a multifaceted approach that involves both non-pharmacologic and pharmacologic interventions (Guck et al., 2003). The American College of Cardiology and the American Heart Association (ACC/AHA) published practice guidelines in 2001 that were developed by cardiovascular specialists to assist medical providers in delivering the best possible care to those with systolic heart failure, the most common presentation of CHF (Hunt et al., 2001).

These guidelines describe that of utmost priority is the pharmacologic treatment of CHF to improve cardiac output and optimize fluid volume status (see Figure 1) (Fletcher & Thomas, 2001). Pharmacologic management of CHF should be established, improving the physiologic functioning of the failing heart and treat excess fluid accumulation. Once CHF treatment goals are reached, then it is appropriate for the health care provider to assess and treat co-morbid conditions such as depression, obesity, hyperlipidemia, and diabetes mellitus more thoroughly (Fletcher & Thomas, 2001).

The use of angiotensin-converting enzyme (ACE) inhibitors in the treatment of heart failure is now considered the gold standard and should be initiated first once the diagnosis of CHF is made (Fletcher & Thomas, 2001). Hunt et al. (2001) state that the development of ACE inhibitors is the most important advance in the treatment of heart failure that occurred in the last decade. Angiotensin receptor blockers (ARB) are also used to treat CHF patients. These have not been determined to be as effective as ACE inhibitors in decreasing afterload reduction by blocking the production of angiotensin II, and decreasing preload and water retention by inhibiting the release of aldosterone by the adrenal cortex. These drugs are recommended for CHF patients who are diagnosed with depression (Fletcher & Thomas, 2001).
Beta blockers are another group of drugs that are recommended in standard treatment of systolic CHF. Beta blockers act by inhibiting the sympathetic nervous system’s effects on the myocardium, thus preventing tachyarrhythmias, preventing episodes of ischemia, and slowing the progression of heart failure, a process known as ventricular remodeling (Branum, 1999). Betablockers have an occasional side effect of depression, and should be used cautiously in patients with a history of depression. It is important that the FNP teach the patient and monitor for this side effect when titrating the beta blocker to therapeutic dosages (Branum).

Digoxin is recommended for use in CHF patients with systolic heart failure, and contraindicated in those patients with diastolic heart failure. It is a positive inotropic agent that acts directly on the myocardium. It has inhibitory effects on the sympathetic nervous system as well as causing reduced neurohormonal activity (Flechter & Thomas, 2001). Diuretic therapy is indicated in the treatment of CHF, and is considered standard therapy. Diuretics inhibit the reabsorption of sodium and chloride at different sites along the renal tubules, therefore causing reduction of fluid volume overload (Connolly, 2000).

Spironolactone is a diuretic and an aldosterone antagonist. When used with ACE inhibitors it is an effective modulator of the RAAS system, thereby inhibiting strong vasoconstriction and preventing excess fluid accumulation. It is used for both diastolic and systolic failure. Diuretics should be used cautiously to avoid excessive reduction of preload (Connolly, 2000).

The use of antiplatelets and anticoagulation medications are indicated in treatment of CHF. Aspirin has been shown to reduce the ischemic events in patients with angina and recovering from myocardial infarction. Therefore, aspirin is recommended for all CHF patients.
that have the heart failure as a result of CAD (Flechter, & Thomas, 2001). Warfarin, an anticoagulant, is indicated for those who are high risk for emboli. Patients who have atrial fibrillation, prior embolic events, or a left ventricular ejection fraction less than twenty percent should be on this medication to reduce the risk of future thromboembolic events (Hunt et al., 2001).

Implications for Family Nurse Practitioners

FNPs in primary care need to be aware of and diagnose CHF in their patients, as the general health care sector is the principal source of treatment for older persons with depression and CHF (Lebowitz et al., 1997). The medical and nursing management of CHF is very complex. FNPs are taking an active role in managing the treatment programs of CHF patients and their families. In order to meet patient treatment goals and to slow progression of CHF, the family must comply with the prescribed pharmacological, dietary, exercise, and health monitoring regimens prescribed (Flechter & Thomas, 2001). FNPs who develop treatment plans for depressed CHF patients recommend teaching sessions with family members and support persons to reinforce a good understanding of the disease process, symptoms to monitor for, medications prescribed and side effects to expect (Flechter & Thomas). Adherence to a low sodium diet is extremely important to the CHF patient’s stability, and often it is a family member that does the shopping and cooking for the patient, and subsequently needs to be educated as well as the patient. Family members can provide psychological support to the CHF patient, giving the patient reassurance and helping the patient focus on the positive aspects of life with chronic CHF (Freedland & Carney, 2000).
Frequent contact with FNPs via telephone, during clinic visits, and via telemonitoring or computer exchange of information can help a CHF patient remember to take medications. Also, this contact with nurses monitors the patient for CHF exacerbations before they are so severe that they require hospitalization. These types of support systems for the CHF patient give them the coping strategies they need to have an improved quality of life and avoid the pitfalls of depression and anxiety (Dahl & Penque, 2000). Nurse directed multidisciplinary CHF disease management programs have been shown in research studies to produce better outcomes with the more comprehensive approach, and thus can decrease the cost of caring for the five million CHF patients in the United States of America. This improvement in outcomes was evidenced by decreased mortality, and decreased length of hospital stays and readmission rates (Dahl & Penque). In patients who are post myocardial infarction, there is nursing research that provides evidence that nursing interventions such as follow-up phone calls and home visits decrease psychosocial stressors and depression, thereby reducing mortality (Frasure-Smith & Prince, 1985). There is additional nursing research needed to document the same effect of these nursing interventions on mortality in CHF patients who are depressed (Thomas et al., 2003).

It is imperative that all FNPs be familiar with the practice guidelines for CHF, so that they may assess and treat these patients carefully and comprehensively in their primary care practice. This management must include the routine assessment and treatment of depression, as the morbidity and mortality related to depression in CHF patients can possibly be prevented if depression is identified in this patient population.
Conclusion

CHF is a debilitating chronic illness in the United States that affects nearly five million people, and is growing annually despite advances in treatment (Hunt et al., 2001). It is estimated that one in five Americans over the age of forty will develop CHF in his or her lifetime, making the prevention and treatment of CHF a major public health initiative (Lloyd-Jones et al., 2002). The FNP must take an active role in assessing and managing CHF, as these patients are often diagnosed and monitored in primary care settings (Artinian, 2003). Standardized practice guidelines provide evidence-based practice recommendations regarding the pharmacologic and non-pharmacologic treatments for CHF (Hunt et al.). FNPs should include in their assessment a routine screening for depression in CHF patients using a valid and reliable depression screening tool. FNPs need to include in the plan of care for CHF patients the treatment of depressive disorders and referrals to mental health specialists and cardiovascular specialists, if indicated. CHF and depression are associated with increased morbidity and mortality rates (Thomas et al., 2003). FNPs need to conduct further research to determine the most effective screening, treatments, and nursing interventions for those who are depressed and have the chronic medical condition known as CHF (Thomas et al.).
References


Table 1

**Diagnostic Categories for Depressive Disorders**

<table>
<thead>
<tr>
<th>Diagnostic Category</th>
<th>DSM-IV-TR Criteria*</th>
<th>Symptom Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Depression</td>
<td>≥ 5 depressive symptoms, including depressed mood or anhedonia, weight loss or gain, insomnia or Hypersomnia, loss of energy, feelings of worthlessness, decreased ability to think or make decisions, psychomotor agitation or retardation, recurrent thoughts of suicide or death. These cause impairment in social/occupational functioning.</td>
<td>≥ 2 weeks</td>
</tr>
<tr>
<td>Minor Depression**</td>
<td>2 to 4 depressive symptoms, including depressed mood or anhedonia, causing significant impairment in social, occupational, or other important areas of functioning. Does not occur during psychotic disorder.</td>
<td>≥ 2 weeks</td>
</tr>
<tr>
<td>Dysthymia</td>
<td>3 or 4 dysthymic symptoms, including depressed mood or anhedonia, causing significant impairment in social, occupational, or other important areas of functioning.***</td>
<td>≥ 2 years</td>
</tr>
</tbody>
</table>

Table 2

*Stages in the Evolution of Heart Failure*

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
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<tbody>
<tr>
<td>Stage A</td>
<td>Patient's at high risk of developing Heart Failure because of the presence of conditions that are strongly associated with the development of Heart Failure. Such patients have no identified structural or functional abnormalities of the pericardium, myocardium, or cardiac valves and have never shown signs or symptoms of Heart Failure.</td>
</tr>
<tr>
<td>Stage B</td>
<td>Patients who have developed structural heart disease that is strongly associated with the development of Heart Failure but who have never shown signs of symptoms of Heart Failure.</td>
</tr>
<tr>
<td>Stage C</td>
<td>Patients who have current or prior symptoms of Heart Failure associated with underlying structural disease.</td>
</tr>
<tr>
<td>Stage D</td>
<td>Patients with advanced structural heart disease and marked symptoms of Heart Failure at rest despite maximal medical therapy and who require specialized interventions.</td>
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</table>

Table 3

*New York Heart Association Heart Failure Classifications*

<table>
<thead>
<tr>
<th>Class</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Class I</td>
<td>Patients with cardiac disease but without resulting limitations of physical activity. Ordinary physical activity does not cause undue fatigue, palpitations, or anginal pain.</td>
</tr>
<tr>
<td>Class II</td>
<td>Patients with cardiac disease resulting in slight limitation of physical activity. They are comfortable at rest. Ordinary physical activity results in fatigue, palpation, dyspnea, or anginal pain.</td>
</tr>
<tr>
<td>Class III</td>
<td>Patients with cardiac disease resulting in marked limitation of physical activity. They are comfortable at rest. Less than ordinary physical activity results in fatigue, palpitation, dyspnea, or anginal pain.</td>
</tr>
<tr>
<td>Class IV</td>
<td>Patients with cardiac disease resulting in ability to carry on any physical activity without discomfort. Symptoms of cardiac insufficiency or the anginal syndrome may be present even at rest. If any physical activity is undertaken, discomfort is increased.</td>
</tr>
</tbody>
</table>

Adapted from “Heart”, by B.M. Massie M.D. & T.M. Amidon M.D. in “Current Medical Diagnosis and Treatment”, p. 431. Copyright 2002, by the Lange Medical Books/McGraw Hill.
Signs and Symptoms of Heart Failure with History and Physical Examination. Obtain 12 Lead EKG, Chest Radiograph, Echocardiogram, or Ejection Fraction

Left Ventricular Ejection Fraction ≤ 40 percent

Assessment of Fluid Volume Status

- Signs and Symptoms of Excess Fluid Retention
  - Begin Diuretic Therapy
  - Monitor Weight Loss
  - Monitor serum electrolytes, renal function, daily weight, blood pressure, heart rate. Provide CHF education

- No Signs and Symptoms of Excess Fluid Retention
  - Begin Angiotensin Converting Enzyme (ACE) Inhibitor
  - Begin Beta Blocker (Carvedilol), consider Digoxin, and Spironolactone

Figure 1. Clinical Management of Heart Failure. (Adapted from the American College of Cardiology/American Heart Association Heart Failure Practice Guidelines, 2001)