A review of literature is an essential part of scientific research. It is a systematic identification, scrutinization and summarization of the written materials that furnishes information relevant to this study.

This chapter consists of two sections,

Section A - Related literature

Section B – Conceptual framework.

SECTION A

2.1. REVIEW ON RELATED LITERATURE

The related literature is arranged under the following headings.

2.1.1. Cardiac rehabilitation

2.1.2. Adherence to cardiac rehabilitation

2.1.3. Exercise

2.1.4. Quality of life

2.1.5. Educational intervention
2.1.1. Cardiac rehabilitation

Abbas, Soleimani., Mojtaba, Salarifar., et al. (2008) conducted a historical cohort study to evaluate the effects of a cardiac rehabilitation program on heart rate recovery after percutaneous transluminal coronary angioplasty on 436 patients of whom 285 were grouped on completion of 5, 10, or 24 training sessions. All 3 groups showed significant improvements in heart rate recovery, peak heart rate during treadmill testing, and end-training heart rate, from baseline to follow-up. Heart rate recovery on follow-up correlated significantly with the number of completed exercise sessions. The cardiac rehabilitation program had a significant effect on peak heart rate and heart rate recovery, regardless of the underlying characteristics of the patients.

Jockes, K., Van Elderen, T., et al. (2007) carried out repeated measures study on self-efficacy and overprotection are related to quality of life, psychological well-being and self-management in cardiac patients. Eighty-two cardiac patients, suffering from CCF or MI, completed questionnaires at baseline and at the end of three months. Perceived overprotection is associated with concurrent levels of anxiety and depression and lowered QOL. Findings have implications for cardiac rehabilitation, where attention may usefully be focused on enhancing self-efficacy and dealing with issues of support and overprotection by the partner.

Moroni, L., Bettinardi, O., et al. (2006) present the findings from a psychometric test of anxiety and depression (AD-R Scale) administered at the beginning and end of a rehabilitation program in patients with cardiopulmonary
disease. The study population consisted of 765 patients affected by cardiac and pulmonary disease undergoing an in-hospital course of intensive rehabilitation. They observed that AD-R scores are related to gender, age and diseases. Depression scores are influenced by age: younger subjects reached lower scores compared with the older ones. Among patients with respiratory disease, the subjects affected by chronic respiratory failure showed statistically significant higher depression scores compared to subjects affected by COPD and bronchial asthma.

Aude, T., Hill, P.D., et al. (2006) investigated the effectiveness of a cardiac rehabilitation program (phase II) in improving participants' quality of life (QOL). The secondary data consisted of pre-cardiac and post-cardiac rehabilitation SF-36 scores for 121 phase II participants. All the 8 subscale post scores of the SF-36 were higher when compared to the pre-rehabilitation scores. In this non-controlled trial, results suggested that participation in rural cardiac rehabilitation programs improves patients' perceptions of QOL and health.

Kardis, P., Bruce, A., et al. (2005) did a study on change in quality of life following the completion of phase II cardiac rehabilitation. 302 patients were assessed in the beginning of cardiac rehabilitation and at 3 months. After 3 months, subjects improved on 8 of the 9 dimensions. Greatest gains were in fitness (22.5%, P < .0001) and daily activities (24.4%, P < .0001). The study findings showed that despite stratification by gender, a sedentary lifestyle and tobacco use, the quality of life markedly improved at the completion of rehabilitation. Completion of a Phase
II cardiac rehabilitation program leads to statistically significant increase in the quality of life following consequential cardiac events.

Briffa, T.G., Eckermann, S.D., et al. (2005) estimated the incremental effects on cost and quality of life of patients who underwent cardiac rehabilitation after an acute coronary syndrome by open randomized controlled trial with 1 year follow-up. Eighteen sessions of comprehensive exercise-based outpatient cardiac rehabilitation was provided for 113 patients aged 41-75 years who were self-caring and literate in English. Patients with uncompensated heart failure, uncontrolled arrhythmias, severe and symptomatic aortic stenosis or physical impairment were excluded. The effects on the quality of life tend to reinforce the treatment advantages on survival for patients who had post discharge rehabilitation after an acute coronary syndrome.

Conte, M.R., Mainardi, L., et al. (2005) evaluated the feasibility of an outpatient management program for patients with CHF. 122 consecutive patients with CHF were enrolled in the study. Etiology was: coronary artery disease 40.2%, dilated cardiomyopathy 18%, hypertension 18%, unknown 14%, valvular heart disease 4.9% and others 4.9%. The endpoints were to compare hospitalization and emergency department admissions in the 12 months before the first evaluation and every year after referral. NYHA classes I-II improved from 65.5 to 87.7% and NYHA classes III-IV were reduced from 34.5 to 12.3%. The Minnesota score decreased from 25 to 21.9. Patients treated with ACE-inhibitors + angiotensin II receptor blocker therapy increased from 91 to 96%, beta-blockers from 35.2 to 69%, potassium sparing drugs increased from 54 to 64%. The study showed that a
medical and nurse-outpatient management program for patients with CHF, decreases the number of hospitalizations, improves functional class and adherence to medical therapy.

Franklin, B., Bonzheim, K., et al. (2002) investigated the effectiveness of a contemporary, exercise-based cardiac rehabilitation program that included a cardiovascular risk-reduction intervention, using a computerized database on 117 patients who completed pre-phase II and post-phase II evaluations. Exercise training involved three, 45 to 60 minute sessions per week for 6 to 8 weeks. Initial and follow-up ratings of overall health were improved: excellent (2.6 to 4.3%) and very good (20.7 to 35.7%). The present findings suggest that a positive correlation generally characterizes the change in coronary risk factors subsequent to a contemporary phase II cardiac rehabilitation program. Patients with the worst coronary risk factor profiles at baseline demonstrated the greatest improvements.

Tyni-Lenne, R., Gordon, A., et al. (1998) described that exercise-based rehabilitation improves skeletal muscle capacity, exercise tolerance and quality of life. Twelve consecutive men (mean age 58 +/- 9 years, left ventricular ejection fraction 29 +/- 9 %) and 12 women with moderate, chronic heart failure stratified according to age and inclusion criteria were investigated. After 8 weeks of knee extensor endurance training, the activity of skeletal muscle citrate synthase and resting heart rate were similar in men and women at baseline and with training they improved (P < .0001). Similarly peak work rate (P < .0001), peak oxygen uptake (P < .001) and muscle strength (P < .05) at baseline were higher in men than in women. The distance ambulated during 6 minutes was similar in both genders at
baseline and increased after training in men (P < .004). The overall and physical Sickness Impact Profile (SIP) indicated reduced health-related quality of life in men and women, while poor psychosocial quality of life was observed in men (P < .05). Both genders improved after exercise training in the overall, physical, and psychosocial SIP (P < .01).

Priit, Jaagosild., Neal, V. Dawson., et al. (1998) conducted a prospective cohort study on outcomes of acute exacerbation of severe congestive cardiac failure involving 1390 adult patients hospitalized with an acute exacerbation of severe CCF (NYHA class III-IV). Demographic data and health-related quality of life were determined by interview; physiologic status, cost and intensity of care were determined from hospital charts. The median age of patients was 68 years; 61.7% were male. Survival was 93.4% at discharge from the index hospitalization, 72.9% at 180 days and 61.5% at 1 year. Of patients interviewed at 180 days, the median health rating on a scale of 0 to 100 was at 60 and 59.7% were independent in their activities of daily living. Patients hospitalized for acute exacerbation of severe CCF have a generally poor survival, but survivors retain relatively good functional status and have good health perceptions.

2.1.2. Adherence

Schweitzer, R.D., Head, K., et al. (2007) conducted a study on psychological factors and treatment adherence behavior in patients with chronic heart failure to demonstrate that depression, anxiety and self-efficacy are independent predictors of adherence, 115 predominantly male (70.6%) volunteers with a mean age of 63 years were recruited from a major teaching hospital in
Australia. Depression failed to predict adherence, Trait anxiety explained minimal variability regarding smoking cessation and alcohol adherence, whereas self-efficacy strongly predicted adherence behavior. The findings assist cardiac nurses to prepare strategies to optimize adherence and quality of life while minimizing public health costs.

Lorraine, Evangelista., et al. (2006) evaluated the impact of three diet interventions on body weight and its potential to reduce cardiovascular risks and improve functional status in 14 obese (BMI >27 kg/m2) patients with heart failure. These subjects were randomized to high protein diet group; low fat diet group or control group as the average diet group. Body anthropometrics (weight, BMI, waist circumference), indices of cardiovascular risks (% body fat, blood pressure, cholesterol, triglycerides) and measures of functional status (6-minute walk, max VO2) were obtained at baseline and after a 12-week nutritional support program. The High Protein diet resulted in moderate reductions in body weight and improvements in several health parameters.

Alexander, J.L., and Wagner, C.L., (2006) determined the relationship between adherence to cardiac rehabilitation (CR) and improvements in health-related quality of life (HRQL) with a 12-week, Phase-II CR program. Patients completed the medical outcomes survey short form-36 to assess HRQL at the beginning of CR (N = 153), at 3 months (N = 152), and at 1 year (N = 94). Pearson correlation coefficient was used to assess the relationship between CR attendance and HRQL. Paired sample t-tests helped to determine the effect of CR on HRQL at 3 months and 1 year. No relationship was found between CR adherence and
improvements in HRQL. Significant improvements in HRQL were found among all patients from baseline to 3 months and 1 year. Study findings demonstrated the effectiveness of CR in improving patient short- and long-term HRQL regardless of patient adherence rate.

Van der Wal, M.H., Jaarsma, T., et al. (2005) conducted a systematic literature review to describe the consequences of non-compliance in HF patients, summarize the degree of compliance in the various aspects of the therapeutic regimen and review interventions that are recommended to improve compliance in HF patients. The study found that non-compliance with medication and other lifestyle recommendations are the major problem in patients with HF. Evidence based interventions to improve compliance in patients with HF are scarce. Interventions that can increase compliance and prevent HF related readmissions in order to improve the quality of life of patients with HF need to be developed and tested.

Ugeskr, Laeger., Pedersen, L., et al. (2005) conducted a randomized, controlled, prospective intervention project to investigate the effect of ambulatory smoking cessation. Both groups were given the department's smoking cessation information. In addition, the intervention group attended five ambulatory smoking cessation intervention sessions. In all, 3,982 patients were screened, 29.5% of whom were smokers. After 12 months, 52% of those in the intervention group compared to 39% in the control group had become non-smokers, which was not statistically significant. Ambulatory smoking cessation intervention had no
significant effect on smoking cessation on an unselected group of patients in a cardiologic hospital department.

Bentley, B., De Jong, M.J., et al. (2005) conducted a qualitative descriptive study with a convenience sample of 20 participants to explore the experience of heart failure patients in following a low sodium diet. Interviews were conducted and analyzed for themes. The data reflected three primary themes about non-adherence to the low sodium diet: lack of knowledge, interference with socialization, and lack of food selections. Participants expressed a need for details about low sodium food selection, food preparation and rationale for the diet. Lack of knowledge was manifested as diet confusion for participants who required additional dietary restrictions. The theme of lack of low sodium food selections was reflected by comments about limited food choices, and lack of palatability. Researchers and clinicians need to consider patients' perceptions as they generate and evaluate interventions to increase adherence to a low sodium diet.

Beswick, A.D., Rees, K., et al. (2004) conducted a systematic review of literature on methods to improve uptake and adherence to cardiac rehabilitation. Surveys of CR programmes were conducted to determine UK provision, uptake, audit activity and to identify local interventions to improve uptake. Data were also examined from a trial estimating eligibility for CR and non-attendance. In England, Wales and Northern Ireland nearly 146,000 patients discharged from hospital with primary diagnosis of AMI, unstable angina or following revascularization were potentially eligible for CR. In England in 2000, 45-67% of these patients were referred, with 27-41% attending outpatient CR. It was found that referral and
attendance of older people and women at CR tended to be low. It was also suggested that patients from ethnic minorities and those with angina or HF were less likely to be referred to or join programmes. Systematic review of studies supported the use of letters, pamphlets or home visits to motivate patients and the use of trained lay visitors. The development of standards is suggested for audit methods and for eligibility criteria, as well as regular and comprehensive data collection to estimate the need for and provision of CR.

Jaarsma.T., Van der Wal1., M.H. et al. (2004) examined all dimensions of compliance and its related factors in HF population. Compliance with medication and appointment keeping was high 90%. In contrast, compliance with diet 83%, fluid restriction 73%, exercise 39% and weighing 35% was markedly lower. Overall compliance was 72%. Compliance was related to knowledge, beliefs and depressive symptoms. Although some aspects of compliance had an acceptable level, compliance with weighing and exercise were low. In order to improve compliance, an increase of knowledge and a change of patient’s beliefs by education and counseling were recommended.

Duncan, K., and Pozehlm, B. (2003) conducted a study to determine how an exercise adherence intervention affects the physiological, functional and quality of life outcomes of patients with heart failure (HF). Sixteen HF patients were randomly assigned to an exercise-only group (n = 8) or to an exercise-with-adherence group (n = 8). Two of the 16 people died from nonexercise related causes during the study and were not included in the analysis. The intervention was tested over a 24-week period in which patients participated in a 12-week
supervised exercise program (Phase 1) followed by 12 weeks of unsupervised home exercise (Phase 2). The study results indicated that patients who received the intervention exercised more frequently and experienced improved outcomes during both phases. The adherence intervention may encourage HF patients to continue to exercise and thereby maintain the health benefits gained in both phases of an exercise program.

Caldwell, P.H., Arthur, H.M., et al. (2007) in his qualitative study on communication about their prognosis and its implications among patients with heart failure using a grounded theory methodology based on one-to-one interviews with 20 patients recruited from Heart Function Clinic at the McMaster University Medical Centre in Hamilton, Ontario. The following four main themes about patient preferences were identified: level of wellness—patients wanted to learn about their prognosis and its implications at a time of optimal cognitive function and not when their capacity for EOL decision making was diminished; opportunity to be informed—patients preferred physicians to initiate discussions about prognosis at the time of diagnosis; tell the truth—there was a strong preference for physicians to disclose prognostic possibilities, treatments and outcomes associated with HF, including the possibilities of deterioration and death; and maintain hope—there was a need for truth to be balanced with hope. The findings suggested that communication about prognosis between patients and physicians may be difficult and deferred. Preferences identified by patients offer guidance to physicians in planning and initiating dialogue about prognosis.
Rogers, A.E., Addington- Hall, J.M., et al. (2000) in his qualitative study explored patients' understanding of CHF, investigated their need for information and issues concerning communication. 27 patients were identified by cardiology and care of the elderly physicians as having symptomatic heart failure (NYHA class of II, III, or IV) and who had been admitted to hospital with HF in the past 20 months. Participants sought information from the research interviewer about their HF, their prognosis, and likely manner of death. They also described several factors that could inhibit successful communication with their doctors. These included difficulties in getting to hospital appointments, confusion, short term memory loss and the belief that doctors did not want to provide patients with too much knowledge.

Neil, C. Campbell., Joan Thain, H., et al. (1998) conducted a study to determine secondary preventive treatment and habits among patients with coronary artery disease in Grampian. Random sample of patients were collected from medical records. Health and lifestyle data were collected by postal questionnaire (response rate 71%). The study results show that 825/1319 (63%) patients took aspirin. Of 414 patients with recent myocardial infarction, 131 (32%) took beta blockers and of 257 with heart failure, 102 (40%) took ACE inhibitors. Blood pressure was managed according to current guidelines for 1566 (82%) patients but lipid concentrations for only 133 (17%). In terms of secondary prevention, half of the patients had at least two aspects of their medical management that were suboptimal and nearly two thirds had at least two aspects of their health behaviour that would benefit from change.
McKelvie, R.S., Teo, K.K., et al. (1995) examined the effects of exercise training on functional capacity in patients with heart failure. One hundred and eighty-one patients in NYHA class I to III, with ejection fraction <40% and 6-minute walk distance <500 meters, were recruited into a randomized, controlled, single-blind trial comparing 3 months of supervised training, then 9 months of home-based training with usual care. There was a significant increase in 6 MWT at 3 and 12 months but no difference between groups. Incremental peak oxygen uptake increased in the exercise group compared with the control group at 3 months and 12 months. Adherence to exercise was good during supervised training but reduced during home-based training. Over the final 9 months of the study, there was little further improvement, suggesting that some supervision is required for these patients.

Randolph, Ice. (1985) explained in an article about long-term compliance to health-promoting behaviors in healthy subjects and patients with CAD. Studies demonstrating problems with patient memory for medical advice is the barrier, for primary or secondary prevention program. Compliance with weight reduction and exercise conditioning programs in healthy subjects is low because of a variety of behavioral, socioeconomic, and pragmatic problems. Long-term exercise training compliance in CR programs, despite the presence of a life-threatening disease process, is also low.

2.1.3. Exercise

Sakir, Arslan., Mustafa, Kemal Erol., et al. (2007) evaluated the prognostic value of the 6-minutes walk test in stable outpatients with heart failure. They
prospectively studied 43 patients (6 women and 37 men) who had chronic heart failure secondary to ischemic heart disease or idiopathic cardiomyopathy. All patients had left ventricular systolic dysfunction (ejection fraction, \[\leq 0.40\]) and they were in stable NYHA functional class II or III heart failure. The patients were divided into 2 groups: Group I, patients with a 6-minute walk test distance of \[\leq 300\] m; and Group II, patients with a 6-minute walk test distance of \(>300\) m. Study concludes that a 6-minute walk test distance of \[\leq 300\] m is a simple and useful prognostic marker of subsequent cardiac death in patients with mild-to-moderate heart failure.

Lee, Ingle. (2007) evaluated the prognostic value of the 6-minute walk test and performed a subgroup analysis according to severity of left ventricular systolic dysfunction (LVSD) in older patients with chronic heart failure. The 6-minute walk test is a sub maximal, self-paced test that is tolerable for many patients with CHF because it imitates activities of daily living. The 6-minute walk test is commonly used to assess patients’ functional status in cardiology clinics around the world.

Jochem, Hogenhuis., Tiny, Jaarsma., et al. (2006) related B type natriuretic peptide(BNP) and 6MWT to left ventricular ejection fraction (LVEF), NYHA functional class and two indices of quality of life (physical subscales): the Minnesota Living with Heart Failure Questionnaire and the short form -36. Plasma BNP and 6MWT were measured at discharge in 229 patients who had been admitted for CHF. LVEF and NYHA were determined and patients completed the MLHFQ and short form -36 questionnaire. BNP was weakly correlated to LVEF
and NYHA at P<0.01, but not to MLHFQ and short form -36. On the other hand, 6MWT is related to the MLHFQ, the short form -36 and to the NYHA at P<0.01, but not to LVEF. There is also no correlation between BNP and 6MWT. The outcomes of this study suggest that BNP plasma levels are more related to cardiac function, while 6MWT reflects functional capacity and quality of life.

Benno, A.F. van Tol., Rosalie, J. Huijsmans., et al. (2006) conducted a meta-analysis to determine the effect of exercise training in patients with CHF on cardiac performance, exercise capacity and health-related quality of life. After including 35 randomized controlled trials, the methodological quality of each sample was assessed for , summary effect sizes (SEs) and the concomitant 95% confidence intervals (95% CI) were calculated for each outcome. During maximal exercise, significant SESs were found for systolic blood pressure, heart rate, cardiac output, peak oxygen uptake, anaerobic threshold and 6MWT. The Minnesota Living with Heart Failure Questionnaire improved by an average of 9.7 points. Exercise training had proved clinically important effects on exercise capacity and HRQL and small positive effects on cardiac performance during exercise.

Oka, R.K., and Sanders, M.G. (2005) conducted a randomized trial to examine the effects of a 3-month exercise program on body composition and nutritional intake in 31 men (17 exercisers; 14 controls), aged 30-76 years with stable class II-III heart failure. Exercise consisted of walking 3 days /week and resistance exercises 2 days /week for 40-60 minutes. Dietary recommendations were consistent with the American Heart Association heart failure guidelines.
Exercisers had reduction of body weight (p=0.001), body mass index (p=0.0001) and triceps skin fold thickness (p=0.03) and improved 6MWT (p=0.01) compared with controls. After exercise, body mass index was reduced, accompanied by dietary modifications including greater intake of foods with higher moisture content.

Laoutaris, I., Dritsas, A. Brown., et al. (2004) conducted a prospective, age and sex-matched controlled study, investigated 35 patients with moderate to severe CHF. The training group (n=20) exercised at 60% of individual sustained maximal inspiratory pressure (SMIP) and the control group (n=15) at 15% of SMIP. All patients exercised three times weekly for 10 weeks. Pulmonary function, exercise capacity, dyspnoea and quality of life were assessed. The results of the study showed that the training group significantly increased both maximum inspiratory pressure (Pimax) and SMIP at P < 0.001. Peak VO2 increased after training at P < 0.005 as the 6 minute walking distance at P < 0.001. Perceived dyspnoea assessed using the Borg scale was reduced for both the treadmill and the walking at P < 0.005, exercise tests and the quality of life score was also improved at P < 0.01. Resting heart rate was significantly reduced with training at P < 0.05. The control group significantly increased Pimax at P < 0.05, but decreased SMIP at P < 0.005.

Van den Berg-Emons, R., Balk, A., et al. (2004) conducted a study to assess whether aerobic training leads to a more active lifestyle and improved quality of life (QOL) in patients with CHF. Patients with stable CHF were randomly assigned to a training group (n=18); or control group (n=16). Measurements were performed on level of everyday physical activity and QOL and
on several related parameters. The study results showed that training did not result in a more active lifestyle or improved QOL, but improved peak power, 6-minute walk distance, muscle strength and depression at \( P < 0.05 \). Changes in level of everyday PA were related to changes in peak \( \text{Vo} \) at \( P<0.01 \) and knee extension strength at \( P<0.05 \). Correlations between training-related changes in parameters suggest that aerobic training has the potential to increase levels of everyday PA in CHF.

Koukouvou, G., Kouidi, E., et al. (2004) assessed the physiological and psychosocial effects of exercise training in chronic heart failure. Twenty-six men with heart failure (NYHA functional classes II and III) were studied. The subjects were randomized to rehabilitation group: 16 patients, participating in a 6-month exercise training program and to control group: 10 patients. A psychosocial assessment, which included affective (Beck Depression Inventory and Hospital Anxiety and Depression Scale), quality of life (Quality of Life Index, Minnesota Living with Heart Failure Questionnaire and the Scale of Life Satisfaction) and personality (Eysenck Personality Questionnaire) parameters, were assessed at the beginning and the end of the study. The findings revealed a significant reduction in anxiety and depression. Moreover, trained patients demonstrated a significant improvement in quality of life. No significant correlations were found between delta\( \text{VO2} \) peak and all psychosocial parameter gains.

Harris, S., LeMaitre, J.P., et al. (2003) conducted a randomized study on home-based electrical stimulation of the legs and conventional bicycle exercise training for patients with chronic heart failure, to compare the safety and efficacy
of conventional bicycle exercise and functional electrical stimulation (FES). Forty-six patients (38 male) with stable NYHA Class II/III heart failure underwent a 6-week training programme using either a bicycle ergometer or electrical stimulation of the quadriceps and gastrocnemius muscles. In the bike group, significant increases were seen in 6-minute walk test, treadmill exercise time, maximum leg strength and quadriceps fatigue index following training. Quality of life scores improved following training when the bicycle and stimulator groups were considered together, but not when considered separately.

Quell, K.J., Porcari, J.P., et al., (2002) investigated whether men and women with coronary artery disease can achieve an exercise intensity that is sufficient to induce a training effect. One hundred and forty-two outpatient volunteers from the William Beaumont Hospital Cardiac Rehabilitation Program and the University of Wisconsin-La Crosse Exercise and Health Program were asked to walk one mile as briskly as possible on measured tracks. These findings suggested that brisk walking is of a sufficient intensity to elicit a Training Heart Rate (THR) in all but the most highly fit patients with coronary disease.

Beniaminovitz, A., Lang, C.C., et al. (2002) performed isolated lower-limb training in 17 patients with severe CHF to investigate whether dyspnoea could be alleviated by selective changes in leg muscle function. Eight patients learned guided imagery relaxation techniques and served as an active control group. Exercise training consisted of three months of low-level bicycle and treadmill exercise such that minute ventilation was <25 l/min. Maximal, sub maximal exercise performance, respiratory, quadriceps muscle strength, endurance, QOL
and dyspnoea scales were measured before and after each intervention. Metabolic
stress testing (VO(2)), pulmonary function tests and isokinetic strength testing
were also performed. The study results showed that in the active control group, no
changes were observed in leg muscle function, pulmonary function, maximal and
sub maximal exercise performance or QOL questionnaires. Perceived dyspnoea
during the sub maximal testing was decreased. Minnesota Living with Heart
Failure Score, Guyatt Dyspnea Scale, and the Transitional Dyspnea Index were
improved with training (p< 0.05). The study concluded that improvement of limb
muscle function alleviates dyspnoea and improves exercise performance in patients
with CHF.

Shah, M.R., Hasselblad, V., et al. (2001) compared the rates of death,
hospitalization and their composite at 1 year by the distance walked in 6 minutes at
baseline, at 1 month and by the change in distance between baseline and 1 month
in 440 patients enrolled in a randomized trial. Of 365 patients able to perform the
baseline walk, 33% died and 60% were hospitalized as compared with 61% and
45% of 75 patients unable to walk at baseline. Baseline distance correlated
moderately with symptom score and NYHA class at p <0.001. Distance walked
during 6 minutes independently and strongly predicted mortality and
hospitalization in patients with advanced congestive cardiac failure.

Malfatto, G., Gritti, S., et al. (2000) illustrated whether a shorter period of
CR could influence the sympatho-vagal balance and the autonomic responsiveness
in 20 patients with clinically stable HF. Etiology was ischemic in 12 and idiopathic
in 8 patients. Patients had comparable NYHA class, EF, exercise pVOz, b-
blockade. Heart rate variability in the frequency domain was assessed by spectral techniques during 10 min of quiet supine resting and free breathing, 10 min of regular breathing at a frequency of 20 acts/mm (= parasympathetic stimulus) and 10 min of standing (= sympathetic stimulus). The evaluation was repeated after 3 months of low-intensity CR (50% of the preliminary anaerobic threshold), that improved pVOa by 22% anaerobic threshold by 20%, and reduced VWC02 by 20%. This finding demonstrates that the beneficial effect of exercise training may appear at an early stage in HF patients during a rehabilitation program.

Willenheimer, R., Erhardt, L., et al. (1998) aimed to examine the effects of exercise training in heart failure patients, 75 years old of both the genders and with various etiology. Fifty-four patients with stable mild-to-moderate heart failure were randomized to exercise or control and 49 completed the study. The exercise programme consisted of bicycle training at 80% of maximal intensity over a period of 4 months. Improvements vs. controls were found regarding maximal exercise capacity and global quality of life at P < 0.01, but not regarding maximal oxygen consumption or the dyspnoea–fatigue index. All of these four variables significantly improved in men with ischemic etiology (n=5), or in patients with non-ischemic etiology (n=6). However, none of these variables improved in women with ischemic etiology, or in patients with non-ischemic etiology. The training response was independent of age, left ventricular systolic function and maximal oxygen consumption.

Sparrow, J., Parameshwar, J., et al. (1994) assessed the efficacy of a 9-minute walking test on a self-powered treadmill in a group of patients with various
degrees of heart failure, to investigate the reproducibility of the technique and to establish the safety of the technique. 24 controls and 37 patients with various grades of heart failure were studied. The distance walked in 9 minutes on a self-powered treadmill was measured in all groups and the test was repeated to assess reproducibility. The distance walked in 9 minutes correlated with peak oxygen consumption in patients, controls and both groups combined. There was a significant difference in the distance walked by controls and patients and in the distance walked by patients with severe rather than with mild or moderate heart failure. The 9-minute walking test on a self-powered treadmill is a sensitive, reproducible, safe and inexpensive method of assessing functional capacity in patients with all grades of heart failure.

2.1.4. Quality of life

Jayadevappa, R., Johnson, J.C., et al. (2007) evaluated the effectiveness of a Transcendental Meditation (TM) stress reduction program for African Americans with congestive cardiac failure (CCF) by randomized-controlled study, recruited 23 African American patients $\geq 55$ years of age, who were recently hospitalized with NYHA class II or III and with an ejection fraction of $< 40$. Participants were randomized to either TM or health education (HE) group. Primary outcome measure was six-minute walk test; secondary outcomes were generic and disease-specific health-related quality of life (MLWHF), quality of well being, perceived stress, Center for Epidemiologic Studies Depression Scale (CES-D), rehospitalizations, brain natriuretic peptide and cortisol. Changes in outcomes from baseline to three and six months after treatment were analyzed by using repeated
measures analysis of variance: co varying for baseline score. The primary outcome of functional capacity, TM group significantly improved on the 6MWT showed significant decrease in CES-D from baseline to six months compared to the HE group at $P<0.03$. Results indicate that TM can be effective in improving the quality of life and functional capacity of African American CHF patients.

Smart, N., Haluska, B., et al. (2007) conducted a study on exercise training in systolic and diastolic dysfunction: effects on cardiac function, functional capacity and QOL. Fifty-one patients with systolic dysfunction (SD) and diastolic dysfunction (DD) were enrolled in exercise training. Peak VO2, quality of life (Minnesota Living with Heart Failure and Hare-Davis questionnaires) and echocardiographic measures were performed at baseline and after 16 weeks of training. Baseline QOL scores were worse in patients with SD. There was a significant increase in peak VO2 in SD at $P = .001$ and DD at $P < 0.001$ after exercise training, but this did not correlate with improved diastolic parameters. In patients with exercise limitation attributed to DD, the improvement in peak VO2 and quality of life with exercise training is similar to those with SD, but unrelated to changes in diastolic function.

Gary, R., and Lee, S.Y. (2007) conducted a preliminary study to test the effects of a home-based walking intervention on total sleep time (TST), nocturnal awakenings, depressive symptoms, physical function and quality of life (QOL) in older women with diastolic heart failure (DHF). Twenty-three women with NYHA class II or III DHF were randomized to either a 12-week home-based walking intervention ($n=13$) or education-only program (control, $n=10$). When outcomes
were compared within each group at baseline and 12 weeks, intervention-group patients had improvement in TST at P<0.01 and heart failure-related QOL at P<0.05. These preliminary findings suggested that a progressive walking program may improve TST and QOL in older women with DHF.

Lewis, E.F., Lamas, G.A., et al. (2007) conducted a study to characterize HRQL in a large population of HF patients with preserved and low LVEF and to determine the factors associated with worse HRQL. Patients were stratified into 2 HF cohorts: preserved LVEF >40% and low LVEF ≤40%. In 2709 of the eligible 2744 (98.6%) patients, the summary scores ranged from 0 to 105 with mean of 40.9. There were no differences in overall responses of HF patients with preserved vs. low LVEF. Independent factors associated with worse HRQL in both populations included female, younger age; higher body mass index, lower systolic blood pressure, greater symptom burden, and worse functional status. In symptomatic HF patients, HRQL is equally impaired in both preserved and low LVEF populations.

Omar, A.R., Suppiah, N., et al. (2007) undertook the evaluation of the efficacy of the community-based multidisciplinary disease management of CHF. This was a prospective study involving 154 patients with a primary diagnosis of CHF, NYHA functional class III/IV CHF, with LVEF <40 %. They evaluated CHF hospitalization, quality of life, activity status and quality of care and beta blockers after a period of six months. At six months, there was improvement in the QOL and activity status at p < 0.001. The rate of CHF hospitalization was reduced by 68 % and statistically significant at p < 0.001 and there was no mortality.
Myers, J., Zaheer, N., et al. (2006) conducted a study on association of functional and health status measures in heart failure. Forty-one patients with HF were assessed with commonly used functional, health status and QOL measures, including maximal cardiopulmonary exercise testing, the Duke Activity Status Index (DASI), the Veterans Specific Activity Questionnaire (VSAQ), the Kansas City Cardiomyopathy Questionnaire (KCCQ) and 6MWT. Pretest clinical variables, including age, resting pulmonary function tests and EF were also considered. Of the components of the KCCQ, peak VO2 was significantly related to QOL at P < 0.05, 6MWT was significantly related to KCCQ physical limitation at P <0.01 and clinical summary at P<0.05 scores. Among pretest variables, only age and EF were significantly related to peak VO2 at P < 0.01. The study findings show that commonly used functional measures, symptom tools, and QOL assessments for patients with HF are poorly correlated with one another and are only modestly associated with exercise test responses.

Rao, A., Asadi-Lari, M., et al. (2006) compared the quality of life in patients with Preserved Systolic Function (PSF) heart failure with that of those with left ventricular systolic dysfunction (LVSD) using generic and disease-specific quality-of-life questionnaires. Four hundred patients with signs and symptoms of heart failure referred for an echocardiogram to assess left ventricular function were invited to complete QOL questionnaires. A total of 278 of 400 (69.5%) responses were adequate for analysis. The mean age of respondents was 72.5 years; 47% were male, 68% had PSF and 32% had LVSD. Both groups were well matched for age, but there were more women in the PSF group (58% vs. 40%).
No significant differences were found in the QOL between PSF and LVSD patients. Women had significantly poor quality of life compared with men in both groups.

Karapolat, H., Durmaz, B., et al. (2006) assessed the health related quality of life of patients with CCF, to correlate quality of life with other functional parameters; maximal oxygen uptake (peakVO2) with submaximal tests (two minute walking test and shuttle walk test) and NYHA with other clinical variables. Health related quality of life was measured with SF 36. Peak VO2 was correlated with SF 36. On the other hand 2 minute walk test and shuttle walk test were correlated with SF 36. There was a correlation between peak VO2 and sub maximal test, but there was no correlation between LVEF, peak VO2 and NYHA class. Social functioning is impaired in patients with CCF.

Eurich, D.T., Johnson, J.A., et al. (2006) compared the relative responsiveness of generic and heart failure specific HRQL instruments, as measured both by common psychometric indices and by external clinical criteria. Analyzed data collected at baseline and 6-weeks in 298 subjects with HF. EQ-5D (US, UK, and VAS Scoring), Kansas City Cardiomyopathy Questionnaire (KCCQ) and RAND12 (Physical and Mental Component Summaries). The study findings showed that the average age of subjects was 60 years, 75 % were men and had moderate to severe heart failure symptoms. Overall, the KCCQ summary scores had the highest relative ranking, irrespective of the responsiveness index or external criterion used. They conclude that the disease specific KCCQ was the most responsive HRQL measure assessing change over a 6-week period, although generic measures provide information for which the KCCQ is not suitable.
Evangelista, L.S., Moser, D.K., et al. (2006) examined the relationship between obesity, HRQOL and depression in 358 patients with HF. Comparative analyses were conducted to determine if body mass index (BMI) was associated with HRQOL and depression in three groups of patients with HF-normal weight, overweight, and obese. Obese patients were younger than normal weight and overweight participants; all other demographic and clinical characteristics were similar. HRQOL and depression scores were significantly higher for obese patients. Body mass index was significantly correlated with all 3 scales of HRQOL as well as with depression. Obese patients with HF are more likely to have poorer HRQOL, physical health, emotional well-being and depressive symptoms. Poorer HRQOL is predictive of worse outcomes in patients with HF.

Rector, T.S., Anand, I.S., et al. (2006) explored the relationships between clinical assessments and patients' perceptions on the effects of HF on their QOL. Measurements of heart failure pathology, symptoms and QOL as measured by the Minnesota Living with Heart Failure (MLHF) questionnaire at 4 month, dyspnea at rest, dyspnea on exertion, paroxysmal nocturnal dyspnoea, orthopnea, fatigue and NYHA class were significantly related to MLHF scores. Combined, these symptoms explained 41% of the variation in MLHF scores. Controlling for symptoms, age explained an additional 4.5% of the variation in MLHF scores, whereas race, gender and available co morbidities each explained <1%. The study found that symptoms of HF explained a substantial proportion of the variation in the effects of HF on patients' QOL as measured by the MLHF score. Pathologic measures of HF including some well-known correlated with the risk of hospitalization and death was not strongly related to symptoms or quality of life.
Mitja, Lainscaka., and Irena, Keberb. (2006) followed 115 patients receiving care in the HF clinic (n = 50) or the usual care (n = 65) for at least 12 months. During the follow-up of 561 days significantly fewer patients from the HF clinic were rehospitalized due to HF. At the end of the follow-up patients from the HF clinic received more optimal pharmacological therapy and reported better QOL. Patient management in the community hospital HF clinic reduced the incidence of HF rehospitalization or death with further benefits in terms of pharmacological therapy and QOL.

Shively, M., Kodiath, M., et al. (2005) determined the effect of behavioral management on health related quality of life (HRQL) in patients with heart failure. Participants (N=116) were randomly assigned to one of two groups: usual care for heart failure (n = 58) and the 15-week behavioral management program (n = 58). Outcomes included exercise performance (6 minute walk), physical and mental functioning (SF-36), general health perceptions (SF-36) and disease specific HRQL (Minnesota Living with Heart Failure Questionnaire-MLHF). Outcomes were assessed at baseline, 4, 10 and 16 months. Participants were mostly male and Caucasian, with a mean age of 67 years. Intervention patients showed significantly improved self-reported disease specific HRQL (MLHF physical dimension scores) over a period of time compared to control group patients. There were no group differences in exercise performance, physical functioning, mental functioning or general health perceptions.

Terzic, Z., Marinkovic, J., et al. (2005) conducted a follow up study to measure the QOL of patients with HF and assessed potential changes during a six-
month period, comprised 56 patients from Cardiovascular Diseases of the Clinical Centre of Serbia. The measurement was conducted by using a special questionnaire for patients suffering from heart disorders, the "Minnesota Living with Heart Failure Questionnaire." The results showed a considerable improvement in the overall QOL between the baseline and second measurements ($F = 6.263; p < 0.020$), as well as considerable improvement in the physical dimension of QOL between the baseline and first measurements ($F = 6.797; p < 0.016$) and between the baseline and second measurements ($F = 5.351; p < 0.030$). The study found that it was possible to measure small but considerable changes in the patients' quality of life.

Smith, B., Forkner, E., et al. (2005) conducted a study to examine the effectiveness of disease management (DM) in improving health-related quality of life (HRQL) among patients with CCF beyond 12 months. Patients in the intervention groups were assigned a registered nurse as a disease manager who performed telephonic patient education and medication management. Health-related quality-of-life data (SF-36) were collected 4 times, at 6-month intervals. Analysis of the SF-36 health transition measure showed a positive effect of the intervention on self-reported improvement in health at 6 months and at 12 months at $P<0.04$ and $P<.004$ respectively. However, no effect of DM was observed across any of the SF-36 components. Women and patients with diastolic heart failure had poorer HRQL scores. The study found that participation in DM had little effect on HRQL outcomes in CCF. Beneficial effects on the SF-36 scale scores seen at 6 and 12 months were not sustained. Therefore, it was unclear whether DM could provide long-term improvement in HRQL for patients with CCF.
Baker, D.W., Asch, S.M., et al. (2005) determined whether participation in a quality improvement (QI) collaborative for heart failure (HF) was associated with better interpersonal aspects of care and health outcomes. Cross-sectional telephonic survey of patients in 6 organizations that participated in QI collaborative for HF (participants, n = 387) and 6 comparable control organizations (controls, n = 414) was carried out and measured the provider-patient communication, education received, knowledge of HF, self-management behaviors, satisfaction and QOL. The participant group patients were more likely to report that their doctor and nurse discussed the treatment options and reviewed self-management. Participants had similar QOL but fewer emergency department visits and hospitalizations. The study found that participation in a QI collaborative for HF was associated with better communication, education and knowledge and lower health care use.

Martensson, J., Stromberg, A., et al. (2005) investigated the effects of a nurse-led intervention on HRQOL and depression in a primary health care (PHC) setting. Patients at eight PHC centers were screened by the diagnosis related groups registry for the diagnosis of HF and eligibility for a cluster randomized study. A total of 153 patients were included, 78 in the intervention group and 75 in control group. The intervention involved patient and family education about HF and self-management and monthly telephone follow-up during 12 months by a PHC nurse. Significant differences were found in the physical dimension measured by the SF-36 health survey and in depression measured by the Zung Self-rating Depression Scale (ZSDS). A nurse-led intervention directed toward patients with HF in a PHC setting resulted in limited effects between the groups, although the
physical and mental status were retained at 12 months of follow-up to a greater extent than in the control group.

Anique, Ducharme., Odette, Doyon., et al. (2005) randomly assigned 230 eligible patients who had experienced an acute episode of CCF to standard care (n=115) or follow-up at a multidisciplinary specialized HF outpatient clinic. The intervention consisted of a structured outpatient clinic environment with complete access to cardiologists and allied health professionals. Patients in the intervention group (IG) stayed in hospital for 514 days compared with 815 days required by patients in the control group. At 6 months, quality of life, which was self-assessed using the MLHF questionnaire, was unchanged in the control group but improved in the IG at p < 0.001. The study concluded that compared with usual care, care at a multidisciplinary specialized CCF outpatient clinic reduced the number of hospital readmissions and hospital days and improved QOL.

Karen, Dunderdale., David, R., et al. (2004) reviewed on Quality-of-life measurement in CHF. It is now recognized that the patient’s perspective is as legitimate and valid as the clinician’s in monitoring health care outcomes. Although there are a number of quality-of-life measures, which can be separated into two types-generic and disease specific-many have been developed, with little or no account being taken of the patient’s perspective. Because most of the widely used measures are not patient centered, they lack sensitivity and specificity in determining those aspects of HRQL important to individual patients.

Masoudi, F.A., Rumsfeld, J.S., et al. (2004) compared the relationship between functional limitation and HRQL between older and younger patients with
HF. 546 outpatients with HF enrolled in a multicenter prospective cohort study. At baseline and 6 +/- 2 weeks later, functional status was assessed by NYHA classification and 6MWT. HRQL was measured with the Kansas City Cardiomyopathy Questionnaire (KCCQ). 484 patients who completed follow-up (194 older and 290 younger patients), were assessed for changes in HRQL. At baseline, older patients had better HRQL than younger patients in spite of worse NYHA class and lower 6-minute walk distances. After multivariable adjustment including baseline NYHA class, older age was independently correlated with better HRQL at P <0.001. Although older patients with heart failure had relatively good HRQL in spite of significant functional limitations, they were at risk for worsening HRQL with further decline in functional status.

Toda, G., Shibata, S., et al. (2004) conducted a study to find out the effect of physical exercise training on HRQOL and exercise tolerance in patients with left ventricular dysfunction. Health-related QOL was evaluated using the Short-Form 36 Health Status Survey before and 3 months after individualized exercise training. The 44 patients who could carry out more than two-thirds of the prescribed exercise were classified into two groups: Group A with LVEF < 40% and Group B with LVEF ≥ 40%. The remaining 21 patients served as the control group. The study results showed that the mean value of SF-36 improved significantly with exercise training in Group A. The 24 patients (9 in Group A, 15 in Group B) with improved SF-36 values after the exercise training showed a negative correlation between the change of the mental component summary and the peak Vo2 at p < 0.05. Exercise training improves both the QOL, especially the mental component, and the exercise tolerance in patients with left ventricular dysfunction.
Jeng, C., Yang, M.H., et al. (2004) conducted a descriptive correlational study to explore the influence of exercise tolerance on quality of life (QOL) among patients with heart failure (HF). Forty-nine participants who met the selection criteria were enrolled at a medical center in Taipei. Data were collected by using the Short-Form 36 and treadmill tests including an exercise intensity-increasing test and duration-increasing test. The results revealed the mean scores of QOL in terms of physical functioning and mental functioning as 66.99 and 68.82, respectively. The average peak VO2 was 4.65 Mets. Patients whose exercise intensity tolerance was $\geq 5$ Mets or whose exercise duration tolerance was $\geq 1800$ s had better physical functioning, but a significant difference in mental functioning was not observed between the two groups. The findings of the study supported the view that exercise testing is safe, feasible, and effective in evaluating exercise tolerance and that both exercise duration and exercise intensity tolerance were important factors in determining QOL, particularly in physical functioning, for HF patients.

Colin Ramirez, E., Castillo Martinez, L., et al. (2004) assessed the effects of a nutritional intervention on clinical and nutritional status and QOL in patients with heart failure. Sixty-five patients with heart failure were assigned to one of the two groups: the intervention group (IG; n = 30) received a sodium-restricted diet (2000 to 2400 mg/d) with restriction of total fluids to 1.5 L/d, and the control group (CG; n = 35) received traditional medical treatment and general nutritional recommendations. At the end of the study, kilocalories, macronutrients, and fluid intakes were significantly lower in the IG than in the CG. IG patients had significantly less frequent edema and fatigue at 6 months than at baseline; in
addition, functional class improved significantly, and no changes were observed in the CG. The IG had a greater increase in total QOL compared with the CG.

Parajon, T., Lupon, J., et al. (2004) highlighted the use of the Minnesota Living with Heart Failure Quality of Life Questionnaire (MLHF) to evaluate quality of life. 326 patients observed for the first time at the unit were evaluated. The median global score on the MLHF Questionnaire was relatively low (28). The study found strong correlation at \( P<0.001 \) between the score and functional class, sex (women had higher scores) and diabetes. They also found a correlation between the score and number of hospital admissions in the previous year \( (P<0.001) \), anemia \( (P<0.001) \) and etiology \( (P<0.01) \) and a weak trend toward higher scores with increasing age \( (P<0.04) \). The scores on the MLWHF Questionnaire in a general population attended by a HF unit in Spain were relatively low. There was a strong correlation between this score and functional class and also between this score and number of admissions in the previous year. These results suggested that the questionnaire adequately reflected the severity of the disease.

Bosworth, H.B., Steinhauser, K.E., et al. (2004) gathered descriptions of the components of QOL as understood by patients living with CHF. Focus groups were conducted with patients with known CHF, NYHA class I-IV and LVEF <40%. Focus groups were audio taped, transcribed and reviewed for common and recurrent themes using the methods of constant comparisons. The study was conducted in three focus groups \( (n = 15) \) stratified by NYHA stage with male patients ranging in age from 47-82 years of age. Five patients were classified with
NYHA stage III/IV and ten with NYHA stage I/II. Thirty attributes of QOL were identified which fell into five broad domains: symptoms, role loss, affective response, coping and social support. Changes in patients’ lives attributed to CHF were not always considered deficiencies; rather, methods of coping with CHF were identified as important attributes representing possible opportunities for personal growth. Clinicians must understand the full range of concerns affecting the QOL of their older patients with CHF. The findings suggested that psychosocial aspects and patient uncertainty about their prognosis were important components of QOL among CHF patients.

Nan, Hou., Michelle, A., et al. (2004) examined the differences in health-related quality of life among 4 groups of patients with HF on the basis of age (<65 years and >65 years) and sex and to evaluate relationships of age and sex to changes in HRQOL for a period of 6 months. A total of 165 patients from 2 outpatient clinics in an urban county hospital were interviewed at baseline and at 26 weeks. Health-related quality of life was measured by using the MLHF Questionnaire and the Chronic Heart Failure Questionnaire. At baseline, patients younger than 65 years had poorer HRQOL scores than older patients. Women had poorer scores than men on some scales, particularly the emotional subscales. At 26 weeks, patients younger than 65 had poorer total HRQOL, than patients of 65 years and older and women had poorer scores than men on total scale. Women younger than 65 years had relatively poorer initial HRQOL that improved after 26 weeks.

Clark, D.O., Tu, W., et al. (2003) conducted a cross-sectional study to correlate the health-related quality of life among lower-income, urban adults with
CCF. HRQL measured by the Kansas City Cardiomyopathy Questionnaire (KCCQ), Chronic Heart Failure (CHQ) and a single question of perceived overall health (PH). Data were obtained from the baseline interview and electronic medical records of 212 patients with 50 years of age and older enrolled during the first 7 months of a medication adherence study. Multivariate regression analyses showed that the pathophysiologic measures ejection fraction and comorbidity were not associated with any of the HRQL measures. These cross-sectional data highlighted the potential significance of social and behavioral factors in CCF-specific HRQL.

Tamura, M., Omiya, K., et al. (2003) conducted a study to develop a measure for disease-specific health-related quality of life in patients with HF and examine its reliability and validity. One hundred and four patients with stable CHF (74 males, 30 females) with LVEF of <40% were enrolled in this study. Each patient responded to the SF-36 and a disease specific questionnaire comprising four categories (dyspnea, sleep, appetite and fatigue). In 25 of the 104 patients, the data in the questionnaire were compared with peak oxygen uptake, anaerobic threshold, slope of the regression line relating the ventilatory equivalent to carbon dioxide output (VE/VCO2 slope) and peak work rate. The anaerobic threshold ($r=0.53$), peak oxygen uptake ($r=0.66$), VE/VCO2 slope ($r=-0.48$) and peak work rate ($r=0.41$) correlated with the total score of the 12 questions. The total scores were closely correlated with the eight components of SF-36. This study suggested that the disease-specific questionnaire is applicable to evaluate the HRQOL in patients with HF.
Mitani, H., Hashimoto, H., et al. (2003) investigated the relationship between cardiac function, exercise capacity and clinical classification and the health-related quality of life (HRQOL) in 91 outpatients with LVEF <40%. Exercise capacity was evaluated by the Specific Activity Scale and HRQOL by the SF 36. Exercise capacity and the cardiothoracic ratio were correlated with the HRQOL related to physical functioning, although the correlation between exercise capacity and mental health were not significant. Factor analysis revealed LVEF was independent of physical functioning. Physical function and exercise capacity comprise a factor reflecting physical HRQOL. Socio-emotional functioning is the third factor independent of LVEF and physical function. Physical and socio-mental HRQOL measurement included information independent of the widely used clinical indices such as LVEF and NYHA classification. The evaluation of HRQOL should be included in the assessment of patient status.

Brown, K. (2003) reviewed current literature on a health-related quality of life (HRQL) measurement tool - the Medical Outcome Short-Form General Health Survey (SF-36) and to examine the evidence for its use in CR. The literature examined indicated that the SF-36 is a sensitive, valid tool that provides broad applicability and is appropriate for use with CR patients. However, it remains to be seen whether a disease-specific tool could be even more effective. More research needs to be performed to compare the generic measures of HRQL directly with the disease-specific measures in CR populations. Until then, the author advocates its routine use as a screening tool in CR to gain insight into areas of concern so that interventions can be planned to improve patient outcomes.
Permanyer., Miralda, G., et al. (2002) assessed baseline characteristics, management patterns and clinical outcomes after 18 months in patients diagnosed as HF in a tertiary hospital in Catalonia, Spain. Patients were interviewed over telephone at 18 months. The mean age of the study population was 75 years, 42% were male, 19% were admitted for causes other than HF and 62% had significant co morbidity. ACE inhibitors or angiotensin II antagonists were used in 54% and beta-blockers in 4%. The 18-month mortality was 46% (77% cardiac mortality). Multivariate predictors of death were older age, severe or previous HF and serious co morbidity. The study concludes that as in other geographic areas, patients in this study are an older population with poor survival, local patterns of care definitely need improvement, co morbidity is important for prognosis, and a significant proportion of survivors enjoy an acceptable QOL long after discharge.

Juenger, J., Schellberg, D., et al. (2002) assessed the health related quality of life of patients with CCF; compared their QOL with the previously characterized general population and in those with other chronic diseases and to correlate the different aspects of QOL with relevant somatic variables at University hospital. The generic quality of life measure (SF-36) was administered to 205 patients with CCF and systolic dysfunction. Cardiopulmonary evaluation included assessment of NYHA functional class, LVEF, peak oxygen uptake and the distance covered during a standardized 6 MWT. Quality of life significantly decreased with NYHA functional class at p < 0.0001. In NYHA class III, the QOL scores were reduced to around one third of those in the general population. The pattern of reduction was different in patients with chronic hepatitis C and major depression and similar in patients on chronic hemodialysis. Multiple regression analysis
showed that only the NYHA functional class was consistently and closely associated with all QOL scales. The 6 MWT and peak oxygen uptake added to the explanation of the variance in only one of the eight QOL domains (physical functioning). LVEF, duration of disease and age showed no association with quality of life.

Steptoe, A., Mohabir, A., et al. (2000) assessed the health related quality of life and psychological wellbeing of patients with dilated cardiomyopathy (DCM) and relates these to clinical variables and psychological adjustment. Postal questionnaire survey was carried out on 99 adult patients with DCM, selected at random from a larger database (60.6% response rate). Assessments included the SF-36 health survey, the hospital anxiety and depression scales, the sleep problems index and a measure of psychological adjustment to cardiomyopathy. Patients with DCM reported significant impairments in physical functioning, role limitations owing to physical and emotional problems, social functioning and mental health, perceptions of general health, sleep and vitality. Anxiety and depression levels were higher than in the population samples. In multivariate analysis, demographic and clinical variables accounted for 0.1-40.7% of the variance in different domains of QOL and psychological adjustment scores accounted for an additional 0.5-22.4% of variance.

Quittan, M., Sturm, B., et al. (1999) examined the impact of a three-month exercise program on the perception of QOL in patients with severe chronic heart failure. In a randomized controlled setting, 27 patients with a LVEF of 18.1 +/- 8.0% were recruited for the study. The training group performed aerobic exercises
for three hours/week while the control group continued their usual activities of
daily living. Quality of life was measured using the German version of the medical
outcome study SF-36. In the exercise group the perception of QOL improved
significantly in the domains of vitality, physical role fulfillment, social functioning
at p < 0.001 and physical at p<0.01. Only weak correlations were registered
between parameters of physical performance and QOL domains. The results of the
study indicated that aerobic exercise can improve the perception of QOL in
patients with severe CHF.

Jaarsma, T., Halfens, R., et al. (1999) determined the differences between
patients with systolic and diastolic dysfunction and to describe factors relating to
quality of life. Three dimensions of QOL, functional capabilities, symptoms and
psychosocial adjustment to illness were assessed during interviews of 186 patients
with CHF. In addition, data on demographic, clinical and self-care characteristics
were collected and patients completed a 6MWT. Most of them described dyspnea,
fatigue, sleep disturbance and ankle edema. In regard to quality of life, the
differences between patients with systolic and diastolic heart failure were the
occurrence of ankle edema and health-care orientation. All three dimensions of
QOL were related to ability for self-care. Their functional capabilities are more
compromised, but they may have fewer problems with psychosocial adjustment.
Patients with normal systolic dysfunction also reported a low QOL.

O’Keeffe, S.T., Lye, M., et al. (1998) conducted a longitudinal study to
examine the reproducibility and responsiveness to change of a six minute walk test
and a QOL measure in 60 elderly patients with HF. Subjects underwent a
standardized 6MWT and completed the chronic heart failure questionnaire (CHQ), a heart failure specific quality of life questionnaire. Intraclass correlation coefficients (ICC) were calculated using a random effect, one way analysis of variance as a measure of reproducibility. 24 patients reported no major change in cardiac status, while seven had deteriorated and 14 had improved between the two clinic visits. Reproducibility was satisfactory for the 6MWT, for the total CHQ score and for the dyspnoea, fatigue and emotion domains of the CHQ. Effect sizes for all measures were large (> 0.8) and responsiveness coefficients were very satisfactory (> 0.7). Effect sizes for detecting deterioration were greater than those for detecting improvement. Quality of life assessment and a 6MWT are reproducible and responsive measures of cardiac status in frail, very elderly patients with heart failure.

2.1.5. Educational intervention

Angela, Clark. (2007) presented the results of an intervention study related to cognitive dysfunction in 34 patients with NYHA Class I-III heart failure. Subjects were randomized to either an attention-control group (n=14) or to an intervention group (n=20). The intervention group received a 3-month in-home education-support intervention that included strategies aimed at improving cognitive impairment and every-day memory. Pre and post-test function were measured with two subscales (Change and Capacity) of the metamemory in adulthood questionnaire. The intervention group had significant improvement on both of these subscales, as compared to the control group. The authors noted that
memory training may be a useful component of future interventions for cognitive impairment in persons with HF.

Ramachandran, K., Husain, N., et al. (2007) described the impact of a comprehensive telephone-based Disease Management Programme (DMP) on QOL in patients with HF. Patients attending the HF clinic were randomized into 2 groups of 25 patients each. The control group(CG) was managed in the HF clinic and the intervention group(IG) underwent the following additional interventions: interactive sessions with the patient and spouse informing them about the disease, drugs and self-management of fluid intake and diuretic dose; a telephonic helpline was established and regular telephone calls were made to reinforce the information and modify drug dosages. The study result shows that there was significant improvement in the QOL and functional capacity of patients in the IG compared with controls over a 6-month period. In the IG, the use of beta-blockers and ACE inhibitors were similar but the IG patients were placed on higher doses. This study demonstrated that in the setting of a developing country, improvement in QOL by intensive management of HF patients through a heart failure programme with telephonic reinforcement and a helpline was greater than that of usually achieved with drug therapy in a routine HF clinic.

Kutzleb, J., and Reiner, D. (2006) conducted a study to evaluate the impact of a nurse-directed approach to patient education, which focused on lifestyle modification, daily weight management, diet and medication compliance to improve the quality of life (QOL) and functional capacity in people with heart failure prospective quasi experimental multicenter study with 23 patients.
comparing a nurse-directed care (NC) group (n = 13), which received comprehensive disease management education and weekly telephone follow-up, and the routine care (RC) group (n=10) that received protocol-driven medical management. Analysis of covariance (ANCOVA) was used to test for equality of variance-covariance matrices in the study population over time. ANCOVA measured baseline and two data intervals for a total of 9 months between the NC and RC groups. There was statistically significant improvement in the NC group for the domains of total QOL, social and economic, psychological and spiritual at p < 0.000, health and function at p < 0.003, and family at p < 0.048. Results indicated that nurse-directed patient education was effective in improving QOL. A nurse-directed treatment strategy significantly improves patients' role in symptom control and disease self-management.

Wierzchowiecki, M., Poprawski, K., et al. (2006) determined whether multi disciplinary care (MDC) for patients with CHF has an influence on mortality, rate of rehospitalisation, quality of life (QOL) and self-care (SC) during a one-year study period. 160 patients with CHF treated in our unit were randomly assigned to receive either MDC or routine care (RC). Telephone counseling and home-based interventions by the HF nurse were also available daily. Patients from the RC group (n=80) were cared for by their primary care physician only. In the MDC group when compared to the RC group they observed a significant decrease in the total number of hospital readmissions and significant at p <0.05, a decrease in hospital admissions due to HF at p <0.05 and decreased length of stay at p <0.05. After one year of follow-up both QOL and SC scores were significantly lower in
the MDC group than in the RC group at p <0.001, indicating improved QOL in the MDC group.

Smeulders, E.S., van Haastregt, J.C., et al. (2006) conducted a randomized controlled trial to evaluate the effects of self management program (SMP) on psychosocial attributes, health behaviour, QOL and health care utilization of CHF patients. Patients allocated to the intervention group were invited to attend the SMP consisting of six weekly sessions, led by a CHF nurse specialist and a CHF patient. Follow-up measurements were carried out immediately after the intervention and at 6 and 12 months after the intervention. The primary outcomes of the effect evaluation are self-efficacy expectancies, perceived control and cognitive symptom management. The secondary outcome measures are smoking and drinking behaviour, BMI, physical activity level, self-care behaviour, HRQOL and perceived autonomy, symptoms of anxiety, depression and health care utilization. The programme's feasibility is assessed by measuring compliance with the protocol, patients' attendance, adherence and the opinions about the programme.

Austin, J., Williams, R., et al. (2005) conducted randomized controlled trial on cardiac rehabilitation in elderly patients with heart failure to determine whether a cardiac rehabilitation programme improved the outcomes in an outpatient heart failure clinic (standard care). Two hundred patients over 65 years of age with New York Heart Association (NYHA) II or III heart failure were randomized. Both standard care and experimental groups attended clinic with a cardiologist and specialist nurse every 8 weeks. Interventions included exercise prescription, education, dietetics, occupational therapy and psychosocial counseling. The main
outcome measures were functional status (NYHA, 6-min walk), health-related quality of life (MLHF and EuroQol) and hospital admissions. The study results showed that there were significant improvements in MLHF and EuroQol scores, NYHA classification and 6-minute walking distance at 24 weeks between the groups at p<0.001.

Grange (2005) highlights the role of nurses in the management of heart failure. Care provided by specialist nurses has been shown to improve outcomes for patients with chronic heart failure (CHF), significantly reducing the number of unplanned readmissions, length of hospital stay, hospital costs and mortality. Once cardiac damage has occurred, the risk of developing HF can be reduced by providing appropriate treatment at appropriate dosages. While CR clinics provide an opportunity to check drug usage, their prime focus is on optimizing patients’ physical well being following a heart attack. The omada programme is a secondary care based, nurse led model of care set up in 1999 to improve the management of CHF by providing appropriate patient education within a nurse led clinic setting, optimizing evidence based medication and fostering partnership between health professionals in both primary and secondary care. The model of care was highly applicable to the post-MI setting, where it could ensure that patients received better care at an earlier stage.

Gonzalez, B., Lupon, J., et al. (2005) conducted a study to evaluate the achievement with nurse education in an outpatient HF population. The questionnaire was addressed to know the compliance and their knowledge about their disease and treatment. Two hundred and ninety eight patients (219 men and
79 women) were evaluated. At first visit only 30% knew and understood the performance of the heart; 56% at 1 year and it is significant at p<0.001. Only 28% initially understood the disease; 55% at follow-up at p<0.001 level. Awareness of more than 3 worsening signs increased from 66.5% to 86.5% at p<0.001. Initially 63% monitored their weight only at the medical visit and 21% monitored it at least once a week; at 1 year these percentages were 16% and 39% respectively at p<0.001. At baseline 45% checked blood pressure only at the medical visit and 28.5% checked it at least once a week; at 1 year these percentages were 12% and 43% at p<0.001. Whereas no significant differences were found in sodium restricted diet compliance, exercise performance increased and statistically significant at p < 0.01. The great majority of patients never or only very rarely smoked or drunk alcoholic beverages, both at first visit and at 1 year, although both habits increased slightly during follow-up.

Miche, E., Herrmann, G., et al. (2003) evaluated the effects of education, self-care instruction and physical exercise on patients with chronic heart failure, to assess the efficacy of an in-hospital rehabilitation program. 75 patients underwent an exercise program including education, bicycle ergometer, muscle strength training and the 6-minute walk test as a training unit for 4 weeks. Patients were studied at baseline (T1), before discharge (T2) and after a follow-up period of 29.9+/−5.5 weeks (T3). Baseline data: LVEF, LVEDV, peak VO (2), maximum work load (Watt max). At T2 and T3, LVEF increased and LVEDV decreased and peak VO (2) increased and Watt max increased at p<0.01. Quality of life improved significantly at discharge and follow-up in nearly all domains and in the summary score for physical health. The study concluded that a specialized in-hospital
rehabilitation program including education, patient self management and training had a sustained positive effect on cardiopulmonary parameters and physical well-being.

Meyer, K., Laederach-Hofmann, K. (2003) conducted a study to assess the effects of comprehensive outpatient rehabilitation program on generic and disease-specific quality of life related to exercise tolerance in stable chronic heart failure patients. Fifty-one patients were treated for 12 weeks. Patients underwent optimized drug treatment, exercise training, counseling and education. At baseline and at the end of the program, functional status, exercise capacity and quality of life were assessed using the medical outcomes study 36-item short-form health survey and the Minnesota Living with Heart Failure Questionnaire. Left ventricular ejection fraction and New York Heart Association functional class, as well as measures of physical fitness and walking distance covered in 6 minutes, improved significantly. Physical functioning, role functioning and mental component score on the questionnaire improved significantly. Disease-specific quality of life improved in sum score and physical component score. In patients with stable chronic heart failure, significant improvements in both generic and disease-specific quality of life related to improved exercise tolerance can be achieved within 12 weeks of comprehensive rehabilitation.

Jaarsma, T., Halfens, R., et al. (1999) evaluated the effects of education and support on self-care and resource utilization in patients with HF. A total of 179 patients hospitalized with HF were evaluated prospectively. The supportive educative intervention consisted of intensive, systematic and planned education by
a study nurse about the consequences of heart failure in daily life, using a standard nursing care plan developed by the researchers for older patients with HF. Education and support took place during the hospital stay and at a home visit within a week of discharge. Education and support from a nurse in a hospital setting and at home significantly increases self-care behaviour in patients with HF. Patients from both the intervention (IG) and the control group increased their self-care behaviour (SCB) within 1 month of discharge, but the increase in the IG was significantly more after 1 month.

Frattini, E., Lindsay, P., et al. (1998) identified the learning needs of CCF patients, to compare the perceived learning needs of CCF by patients and nurses and to identify existing gaps between their perceptions. Fifty CCF patients and 47 cardiac nurses were surveyed using a modified version of the CCF Patient Learning Needs Inventory developed by Hagenhoff et al. This instrument measured the importance of specific learning topics within the categories of anatomy and physiology, medications, diet, risk factors, activity, psychological factors and other pertinent information. The results indicated that both groups found most information "moderately" to "very" important to learn. The patients generally rated all information items higher than nurses did. The most significant finding was that the nurses rated the diet category as second in importance, while the patients rated it last.

2.2. CONCEPTUAL FRAMEWORK

Nursing theory provides autonomy by guiding practice, education and research to function as a profession. Theory helps to develop analytical skills,
critical thinking ability, clarify values and assumptions and determine the purpose of nursing practice and research. Nursing theory helps to establish criteria to measure the quality of nursing care.

Nursing theory provides the foundation for nursing practice that helps to generate knowledge and indicates the direction of nursing future. Theory helps us to decide what we know and what we need to know and distinguishes what should form the basis of practice by explicitly describing nursing. The benefits of having a defined body of theory in nursing include better patient care, enhanced professional status for nurses, improved communication between nurses and patients and guidance for research and education.

Conceptual framework for this study was based on Nola J. Pender’s Health Promotion model (1996) to assess the effectiveness of nurse-led cardiac rehabilitation on adherence and quality of life among the patients with heart failure at Sri Ramachandra Medical Centre.

Nola J. Pender developed the health promotion model that is proposed as a holistic predictive model of health-promoting behavior of the patient during illness. Health promotion model has given a new dimension to health care, health promotion and disease prevention as the primary focus in health care. When health promotion and prevention fails to prevent problems, then care in illness becomes the priority. Prevention is better than cure, thus health promotion is valued much. Nurses could do more by means of caring touch and therapeutic talk in rendering care. Health teaching is always the nurses’ role. Despite various clinical specialties
or community care settings, nurses interact with patients and have a common primary concern: to promote the health of every individual.

The concept of health promotion is popular in practice; personal responsibility for health care is a cornerstone for every plan of health care reform. The health promotion model identified cognitive perceptual factors in the individual that are influenced by situational, personal and interpersonal characteristics to participate in health promoting behaviors. The cognitive perceptual factors defined as “primary motivational mechanisms” for the activities related to health promotion are: importance of health, perceived control of health, perceived self efficacy, definition of health, perceived health status, perceived benefits of health promoting behaviors and perceived barriers to health promoting behaviors.

The 1996 revision of the model adds three new variables that serve to influence the individual to engage in health promoting behaviors: activity-related affect, commitment to plan of action, and immediate competing demand and preferences.

Individual characteristics and experiences include certain modifying factors as well as prior related behaviors. The modifying factors play roles in the determination of health care behaviors. In this study the modifying factors are background variables which include demographic variables, clinical variables and biophysiological parameters. The demographic variables included in this study are age, gender, education, occupation, marital status, religion, residence, type of family, family monthly income and use of tobacco. The clinical variables such as
diagnosis, duration of illness and co-morbid condition influences the health promoting behavior of an individual. The biophysiological parameters are body mass index, blood pressure, lipid profile, random blood sugar, hemoglobin and serum electrolytes such as sodium and potassium. These modifying factors have indirect influence on behavior.

According to health promotion model, modifying factors exert their influence through the cognitive-perceptual mechanisms that directly affect behavior. The following are cognitive-perceptual factors, defined as “primary motivational mechanisms” for the activities related to health promotion. Since heart failure is a chronic disease, patients would have experienced the health related problems for a longer period of time. These problems would have influenced the patient and the value of importance of health which help them to promote their health, thereby minimizing their sufferings.

Perceived self efficacy influences the health behavior of an individual. A structured teaching program on cardiac rehabilitation can positively influence the health promoting behavior. Hence, the investigator enhances their health status through a structured teaching on the following components of cardiac rehabilitation: knowledge on disease condition, medication, diet, exercise and lifestyle modification, thereby preventing the complications of heart failure as well as controlling their behavior to improve their health status. This teaching on cardiac rehabilitation will lead to develop a desire for a control on health and the perceived probability of control on health status; for example, weight reduction behavior, regular exercise, smoking cessation and lifestyle modification etc.
The perceived barriers in health promoting behaviors will influence the patient to participate in the cardiac rehabilitation. The important barriers like lack of time, money, support or motivation as well as lack of knowledge on disease condition are considered in the structured teaching program.

Perceived benefits of behavior will vary from each individual, to enhance this behavior the investigator insisted on importance of adherence to cardiac rehabilitation and explained the outcome of such a behavior. Perceived benefits of action were also assessed and facilitated their learning on cardiac rehabilitation, by providing a booklet and reinforcement over telephonic conversation on the importance of adherence to cardiac rehabilitation for the study group.

Inter personal influences on health promoting behaviors include interaction with the health care team members, support from family members and peers. Important situational or environmental determinant of health promoting behavior includes availability of health promoting options and access to health promoting alternatives. For example, low cholesterol diet and low sodium diet may be challenging while consuming food outside or in a social gathering. In such situations this will be a challenge for the patients to follow health promoting behavior. The structured teaching on cardiac rehabilitation will help the patient to appreciate the importance of health promoting behavior in such a situation.

Commitment to a plan of action is an individual’s ability to understand the importance of adopting the healthy way of living to ensure the optimal quality of life.
The likelihood of taking health promoting action depends on activating cues either of internal origin or emanating from the environment. Personal awareness of increased feelings of wellbeing from the beginning of the health promoting efforts are important internal cues for behavior. Competing preferences are alternate behaviors with high personal control such as choosing low sodium diet and regular exercise etc. The intensity of the cues needed to trigger action will depend on the level of readiness of the individual to engage in health promoting activity. The perceived quality of life will not make a difference, if the individual has low competing demand to the health promoting behavior.

Hence, patients with chronic heart failure should participate in the cardiac rehabilitation program to ensure their quality of life by smoking cessation, lifestyle modification and improving exercise tolerance. Nurses working in the cardiac department should help the patient to understand the importance of such programs, mutually benefiting the patient and health care organization.
Figure 1. Conceptual Model on Modified Pender’s Health Promotion Model

I. BACKGROUND VARIABLES
   A. Demographic variables
      • Age, Gender
      • Education, Occupation
      • Marital Status, Religion
      • Residence, Type of Family
      • Income, Tobacco use
   B. Clinical Variables
      • Diagnosis, Duration
      • Co-Morbid condition
   C. Biophysiological parameters
      • BMI, Blood Pressure
      • Lipid Profile
      • Random Blood Sugar
      • Hemoglobin
      • Sr. Electrolytes

II. BEHAVIOUR SPECIFIC COGNITIONS AND AFFECT
   A. Perceived benefits of action
      • Reduce cardiac symptoms
      • Improve quality of life
      • Improve exercise tolerance
   B. Perceived barriers
      • Lack of knowledge, time
      • Not able to tolerate
      • Lack of motivation, money
   C. Interpersonal Influences
      • Interaction with health care team members and family
      • Routine care
      • Teaching on cardiac rehabilitation
   D. Situational Influences
      • Environmental factors
      • Booklet on Healthy way to Healthy heart

III. BEHAVIORAL OUTCOME
   A. Immediate competing demand
      • Low control
      • High control
   B. Commitment to a plan of action
      - Adherence to cardiac rehabilitation
      - Gain knowledge on heart failure
      - Lifestyle modification
   C. Health promoting behavior
      • regular medication
      • regular exercise
      • regular follow-up
      • Diet modification
      • Fluid restriction
      • Quit smoking

Figure 1. Conceptual Model on Modified Pender’s Health Promotion Model