EVALUATION OF AN EARLY DISCHARGE SERVICE FOR CARDIAC REHABILITATION AT HOME

Ву

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ABSTRACT

This study evaluates the outcomes of a hospital-based cardiac rehabilitation program designed to deliver the first phase of cardiac rehabilitation services at home. The program was established in a community hospital in 1985, operating under the administration of the hospital's Medical Day Centre. Patients suffering from acute myocardial infarction (MI) are referred to the program by their physician and receive services from a cardiac nurse specialist immediately upon discharge. The services continue for a period of 6 weeks. The outcomes of importance in the study are the effects of the program on hospital services in the initial 10 month period and on patient's health related behaviour 3 months post infarction. Results of the study indicate that program goals were achieved during the initial 10 months of the study. Physicians referred 92% of the eligible patients and the average length of stay (ALOS) in hospital was satisfactorily reduced. For patients with uncomplicated MI the ALOS was 8.6 days by the tenth month. At 3 month follow up, patients reported significant improvements over their pre infarction health related behaviour. There were significant increases in the frequency of light exercise (p<.0005), in the regular use of low fat dairy products (p=.0003)and in the practice of restricting calories (p=.003) while significant decreases were reported in the frequency of consuming fried foods (p<.0005), salted foods (p<.0005) and rich foods

(p < .005) and in the regular use of table salt (p=.00003). Smoking cessation was reported by 50% of the smokers at follow up. Patients reported a high level of satisfaction with the program, describing the service as well timed, informative, practical and valuable in restoring their self confidence. While these results were satisfactory with regards to the program goals, the evaluation was based on a single group design and further investigation is desirable with comparisons between hospitals and between patients with and without exposure to the program.

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INTRODUCTION

Cardiac rehabilitation is designed to reduce the consequences of established cardiac disease and restore patients to an optimal level of functioning at work and at leisure. Current cardiac rehabilitation programs began with a trend toward early mobilization of myocardial infarction (MI) patients in hospital in the early 1950's (Wenger, 1984a). This was supported by continued evidence of its benefits, and by the developments of treadmill exercise testing and ambulatory electrocardiography (ECG). Programs have now extended, in general, to include three phases of rehabilitation:

Phase I, beginning in hospital with low level activity, and progressing to ambulation and stair climbing;

Phase II, a hospital-based exercise program; and

Phase III, a community-based exercise maintenance program.

With the advent of the Framingham Study (Dawber, 1980) in 1950 the ground work was laid for addressing the reduction of primary risk factors, and hopefully for identifying new opportunities to interrupt the natural history of cardiac disease. Although studies in secondary prevention have largely focussed on pharmacological and surgical interventions, there has also been rapid growth in the area of psychological research since the early 1970's. Cardiac rehabilitation programs have adopted much work and research from this latter area in managing the behavioural aspects of risk factors, especially smoking

cessation and weight control, and by the early 1980's one review (Froelicher & Pollock, 1983) reported that 40% of the rehabilitation programs included behavioural change strategies in risk factor reduction. Although associations between risk factor reduction and recurrent cardiac events are still being established, initial studies on multi-factoral rehabilitation programs (Friedman, Thoreson, et al, 1984; Frasure-Smith & Prince, 1985; Kallio, Hamalainen, Hakkila & Luurila, 1979; Oldenburg & Perkins, 1985; Rahe, Ward & Hayes, 1979; Roviaro, Holmes & Holmsten, 1984) show positive trends and support the efforts of those addressing risk factor reduction in their programs on the simple basis that it is wise and prudent.

Few stress management strategies were reported in this 1983 review, perhaps because the concept of stress was not identified amongst the original risk factors. However, the recent multifactoral studies refer to it more frequently. This coincides with the formal recognition of the importance of Type A, or coronary prone behaviour in 1980 by the National Heart Lung and Blood Institute (NHLB) (Weiss, 1981), and is supported most strongly by reports of the Recurrent Coronary Prevention Project (Freidman, Thoreson, et al, 1984) which succeeded in reducing recurrent infarctions by reducing coronary prone behaviour with psychological strategies.

The various aspects of cardiac rehabilitation just mentioned involve a relatively complex but loosely woven network of services that are dependent on both interdisciplinary, and

interagency, cooperation and referral to be most effective. The program evaluated in this study is newly established in a 400 bed community hospital and focusses on the provision of Phase I It has the unique feature of employing a cardiac services. nurse specialist to deliver the service to patients at home, while simultaneously providing an opportunity for physicians to discharge patients earlier. Inherent in the process is an opportunity for the patient to receive consistent, easily available care in the earliest stages of rehabilitation, and to become integrated with other aspects and phases of the cardiac rehabilitation network. Evaluation of the program focusses on two areas of outcome - impact of the program on other hospital services and clinical outcomes of the service, as well as discussing the relevant literature and historical context of the program.

The study is developed within a conceptual framework that utilizes a basic understanding of systems theory and refers to two separate models, one for each area of outcome in the evaluation. This perspective provides recognition of the ongoing nature of planning/evaluation and behavioural change processes, and provides an opportunity to acknowledge the relevance of current principles in health promotion. Also, the models are flexible and can be adapted to particular features of the program.

Chapter I reviews information on cardiovascular disease in general and the use of current health indicators in describing

and evaluating the rehabilitation of myocardial infarction patients. The relevance of current principles in health promotion is also considered. Chapter II describes the conceptual framework and its relationship to the design and process of the evaluation. Chapter III provides a description of the program being evaluated, including historical and political factors in its development, and Chapter IV explains the design and methodology involved in the evaluation. The results and their analysis are contained in Chapter V, and Chapter VI concludes with discussion and recommendations.

CHAPTER I: OVERVIEW

A. Cardiovascular Disease

Cardiovascular disease (CVD) is a broad term covering several diseases of the circulatory system. The most common forms of CVD are ischemic or coronary heart disease (IHD/CHD), and in particul acute myocardial infarction (MI) and cerebrovascular disease. Both forms are linked to arteriosclerosis. Other forms of CVD include hypertension, rheumatic heart disease and various other related cardiovascular problems.

1. Mortality

CVD is presently the leading cause of death in Canada and has accounted for more than half of all deaths for the past three decades. In 1982 60% of these CVD deaths were due to ischemic heart disease (IHD) and 20% from cerebrovascular disease (Nicholls, Nair, MacWilliam, Moen & Mao, 1986). Cancer follows CVD in second place, accounting for almost one quarter of all deaths, while deaths from accidents, poisoning and violence are in third place. The data indicates a variety of patterns by age, sex and geography, as well as changing trends in the mortality rates among these leading causes of death. Changes relevant to CVD will primarily be discussed in terms of IHD since this form of CVD accounts for the greatest number of

CVD deaths as well as showing the greatest decline in mortality recently.

In 1985 IHD on its own was the leading cause of death in Canada accounting for 40% of all deaths (Causes of Death, 1986). The gap between cancer and IHD has been narrowing over the last several years, however, as mortality rates from IHD have decreased substantially and those from cancer have increased slightly. At a provincial level cancer has surpassed IHD as the leading cause of death in B.C., Alberta and Quebec. Variation by sex is evident. Using age standardized death rates, mortality from cancer exceeded that from IHD in females at a national level as of 1983 while for males the change was limited to the three provinces of B.C., Alberta and Quebec. Cancer, therefore, is seen to be replacing IHD as the leading cause of death much more rapidly for women than men although it has not surpassed IHD as the overall leading cause of death at a national level (Causes of Death, 1986).

As mentioned the greatest influence on this trend is reported to be the declining mortality rates for IHD. These declines began in both Canada and the U.S. in the mid 1960's and were first noticeable in the western regions where the rates were already lower. Both countries have experienced a decline that has progressed more rapidly in recent years and has been greatest in eastern regions. Over the last decade Australia, Belgium and Finland have also shown pronounced declines; however, in France and some Eastern European countries there

have been significant increases. In many countries there has been little or no change reported (Nicholls, Nair, MacWilliam, Moen, Mao, 1986).

Although there is general agreement that these declines represent a genuine change, rather than statistical artifact, there is no consensus on whether it is due to a decrease in the incidence or severity of the disease, to improved survival or to a combination of the two. Until this is resolved it is uncertain whether the trend is due to lifestyle changes amongst Canadians that could reduce the incidence and severity of IHD, to more widespread use of advanced medical and surgical technology that could increase survival, or to some combination of the two. When more information is available better evaluation of desirable resource allocation will be possible on a population basis.

2. Health Care Costs

Current health care costs for CVD remain large, however, despite declining mortality and are expected to remain that way in the foreseeable future. In Canada the direct hospital costs alone have been estimated at \$2 billion a year (Nicholls, Nair, MacWilliam, Moen & Mao, 1986). Such estimates are based on the ongoing body of data from the national hospital insurance plans and incorporate data on the number of days in hospital, the number of hospital discharges per year and the medical reasons for hospitalization along with other factors. A recent federal study on CVD in Canada (Nicholls, Nair, MacWilliam, Moen & Mao, 1986) reviews hospitalization patterns and reports that IHD and cerebrovascular disease are second only to mental illness as the leading cause of hospitalization in Canada. Between 1971 and 1981 there was little change in the number of days spent in hospital by people with IHD but a substantial increase in the number of hospital days consumed by patients with cerebrovascular disease.

Among men, IHD and cerebrovascular disease combined were the leading reason for hospitalization, accounting for more than 3,400,000 hospital days spent in 1981. This compared with approximately 1,600,000 days spent in hospital for men with cancer and almost 1,700,000 days for mental diseases.

IHD and cerebrovascular disease were the leading cause of hospitalization for women, accounting for approximately 4,000,000 hospital days. This compared with 2,330,000 days for deliveries and 2,272,000 days for mental diseases.

The hospital discharge rates for both men and women increased in the early 1970's. For men, the rate peaked in 1974 before declining, while for women the peak year was 1973. The decline has been more consistent for women than for men in the latter years. Although the hospital discharge rates have declined, the 1980 rate remains higher than the rate at the end of the 1960's for men, and only slightly lower for women.

3. Morbidity

Other repercussions of CVD are the extensive personal, social and economic costs that arise in addition to those costs incurred by the health care system. A description of these other repercussions follows, within the broad framework of morbidity presented in the recent federal publication, Demographic and Health Indicators (Peron & Strohmenger, 1985). Using this framework these repercussions can be included within different classes of morbidity that are described in 2 ways, one by the method of observation and one by their relationship to the onset of disease. Differences are recognized between the use of the terms precursor, risk marker and risk factor in this model and in the WHO Dictionary of Epidemiology (1983).

Three types of morbidity arise depending on the method of observation: perceived morbidity, or the experience of altered function and behaviour as reported in population surveys; diagnosed morbidity, or that identified by medical diagnosis and best known from hospital morbidity statistics, and occasionally from disease registers; and objective morbidity, or that which could ideally be identified by systematically examining representative groups in the population. To date the hospital or diagnosed morbidity has been the familiar measure of morbidity and it has matched quite closely with other disability and mortality data for the principal causes of hospitalization (excluding child birth). However, interest in perceived

morbidity has recently attracted increasing interest, in part because of its role in determining demand for care.

Potential morbidity and behavioural morbidity are the two types of morbidity related to the onset of disease. Potential or antecedent morbidity relates to those factors that are identifiable as antecedents of disease and which may be classified as precursors, or biological abnormalities, that are detectable before the appearance of the first symptoms or clinical problems; risk factors, or other characteristics that are often behavioural and/or are amenable to intervention; and risk markers, or characteristics of individuals or their environment which are uncontrollable or can only be controlled with difficulty.

The concept of behavioural or consequential morbidity relates to the consequences of disease and is developed from a number of disease-induced behaviours that reflect the social and economic repercussions of disease. These effects are described as deviations from the norm and are fundamentally characterized as impairments, or biomedical deviations that determine any loss or abnormality or psychological or physiological functioning; and/or disabilities, or deficiencies that restrict the ability to perform an activity in the manner or range considered to be normal. Thus any person who, because of impairment or disability, is at a disadvantage with life in society compared to peers may be considered as having a handicap.

There are several advantages for describing and estimating IHD and MI morbidity in this context: it involves an understanding of current work on health indicators, it strengthens the link between traditional epidemiology and clinical practice and it relates easily to the systems models in the next chapter. Reference will be made to a model (see Figure 1.1) adapted from the report on Demographic and Health Indicators in the discussion. Although at first glance only one aspect of the model, consequential morbidity, may appear to have relevance for cardiac rehabilitation it becomes clear on further consideration that the antecedent factors are necessary to understand the context in which patients have had an MI as well as for planning various aspects of rehabilitation. Thus information on both types of morbidity will be presented.



FIGURE 1.1 MORBIDITY AND MORTALITY OF ISCHEMIC HEART DISEASE

a) Antecedent Morbidity

Antecedent or potential morbidity will be described first. Before the Framingham Study it was generally accepted that atherosclerotic disease, especially ischemic heart disease, was an inevitable result of the aging process. However, as a result of the study it was established that hypertension, hypercholesterolemia and smoking were major factors increasing the risk of IHD and MI as well as inactivity, obesity and diabetes (Dawber, 1980). Since then Type A behaviour and related personality factors have also been associated with increased risk of IHD and MI (Weiss, 1980). It is important to remember, however, that research has also indicated that the classical factors originally established in the Framingham Study account for only about one-half of the IHD incidence in middleaged American men (Keys, Aravanis, et al, 1972). Also while the presence of more factors indicate greater likelihood of IHD, it has been shown that the best combination of these factors still fail to identify most new cases of the disease (Jenkins, 1971). In any case, the benefits of primary intervention with these factors has proven to be greater than those of secondary prevention post infarction (Kannel, 1984). In the following section each established factor, including psychological factors will be mentioned separately as either a precursor, risk factor or risk marker.

i) Precursors

As with several other factors, Hypertension: increasing values of blood pressure beyond an optimal level produces increasingly higher relative risks. Assuming a normal blood pressure as being 120/80, then a blood pressure of 160/95 roughly doubles the risk of IHD. Similarly those with a diastolic pressure of 95 to 105 have twice the heart attack risk of persons of 75 to 85 (Simborg, 1970). In a review of coronary risk factors Milsum (1984) reports a range of relative risk levels of 1.5 for 140/90 to 2.5 for 160/95 to a maximum relative risk of 6. In a review of data from the National Centre for Health Statistics, Smith (1987) reports no change in the prevalence of hypertension between surveys completed in 1962 and 1974, but a decrease by the late 1970's that coincides with public and professional campaigns addressing the hazards of hypertension. The effects of controlling hypertension are demonstrated in terms of decreased mortality and morbidity in the Hypertension Detection and Follow up Program (1979). The Recommendations of the Scientific Councils of the International Society and Federation of Cardiology on Risk Reduction after myocardial Infarction (Koeniq, 1986) at Titisee in the late 1983, known as the Titisee Report, acknowledge that higher mortality and reinfarction rates are associated with hypertension after an MI, and that control of the risk is important.

Hypercholesterolemia: Progressively higher relative risks are associated with higher serum cholesterol concentrations, as just desribed for high blood pressure. Levels of 175 mg/dl have less than 1/2 the risk of MI of those with levels between 250 and 275 mg/dl. and less than 1/3 the risk of those with levels above 300 mg/dl. (Smith, 1987). Milsum (1984) reports similar figures with a maximum reported relative risk of 5.5. Recently the Coronary Primary Prevention Trial has demonstrated a significant reduction in mortality from dietary and drug interventions. However Kannel (1984) reports that high serum cholesterol levels have not been consistently related to reinfarction and death and that now the low density lipoprotein/high density lipoprotein (LDL/HDL) cholesterol ratio should be considered as well. The Titisee Report (Koenig, 1986) recognizes the inherent controversies and concludes that hypercholesterolemid due to elevated levels of low density lipoprotein should be treated even though it presents less risk after an MI than before the first attack.

<u>Diabetes</u>: The Framingham data show that of those men, aged 30-59, initially free of IHD, diabetics have 1.4 times greater incidence of IHD than nondiabetics. The incidence in diabetic women is 2.5 times greater. The risk of death from IHD is 2.3 times higher in diabetic men and 5.7 times higher in diabetic women. Approximately 2% of the American population is diagnosed as having diabetes (Simborg, 1970). Control of diabetes with oral or injectable insulin has not been convincingly shown to reduce the sequence of IHD although treatment should, for other reasons, follow the usual guidelines (Kannel, 1984).

Abnormal ECG: As a precursor, an abnormal ECG refers to any of a variety of deviations from the normal in an individual who is either at rest, or under controlled exercise conditions and clinically free of IHD. Simborg's report (1970) indicates that a wide variety of resting abnormalities were established by the Tecumseh and Framingham Studies and an increased risk of IHD is demonstrated in the latter study. In an 8-year follow-up of the Framingham study, the risk of developing CHD is 3 times higher if the initial EKG showed T-wave inversion, twice as high for codable Q waves, and 1.25 times higher with initial flat T-There is no risk associated with ST-segment depression. waves. After 12 years, the risk of death from CHD is 8.9 times higher in those who have ever had left ventricular hypertrophy by EKG criteria compared with those who have not. The risk is 6.7 times higher for complete intra-ventricular block. However little information is available on whether abnormalities can be altered toward normal and none on whether it would affect the incidence of IHD.

ECG exercise testing began with the Master's two-step test in the 1920's and now involves bicycle ergometry and treadmill testing. Many tests and evaluation criteria have been developed and many studies indicate that significant ischemic depression on an exercise ECG is one of the strongest risks for IHD known. Simborg found no reports of failure to associate a positive exercise test result with increased risk of IHD.

ii) Risk Factors

Smokers have mortality ratios greater than those Smoking: of nonsmokers and these ratios increase with the amount smoked. Mortality ratios are 1.4 for smoking less than 10 cigarettes daily, 1.7 for 10 to 19 cigarettes daily, 1.9 for 20 to 39 cigarettes daily and 2.2 for more than 40 cigarettes daily. Overall, smokers relative risk of death is 1.7 times greater than nonsmokers (Passamani, Frommer & Levy, 1984). Milsum (1984) reports the range of relative risks from 1.5 to 6.5. The prevalence of smoking in the U.S. has decreased, between 1965 and 1980, from 52% to 38% in men and 34% to 30% in women. Relative risks decline following cessation of smoking until a risk level comparable to nonsmokers is reached (Smith, 1987). The Titisee Report (Koenig, 1986) concludes that smoking is undoubtedly a major primary risk factor for IHD and identifies at least six nonrandomized studies in secondary prevention that have shown significant reduction of both fatal and nonfatal MI in patients who stopped smoking compared to those who did not. Smoking cessation is suggested to be the most effective single intervention in the management of IHD and MI.

Physical Inactivity: Although increasing physical activity has been a major goal in both primary and secondary prevention programs, the effects of physical training alone have proven to be controversial in terms of reducing both fatal and nonfatal occurrences of MI (Kannel, 1984). In particular Kannel mentions the failure of the most carefully controlled trials to show any significant benefit in preventing reinfarction or prolonging life. However the importance of physical activity is generally accepted. According to the Titisee Report (Koenig, 1986) dynamic exercise can be recommended as secondary prevention for several established reasons:

- To combat the deleterious effects of immobilization.
- To improve physical working capacity and cardiovascular performance.
- 3) To increase self confidence, emotional stability, and to decrease depression and fear.
- 4) To facilitate return to normal life (including work if appropriate).
- 5) To improve weight control, joint mobility and stability and neuromuscular coordination. It may also encourage patients to modify other more powerful risk factors.
- 6) To induce favourable metabolic changes such as increase of HDL relative to LDL cholesterol, decrease of triglyceride levels and increase in the sensitivity to insulin.

<u>Body Weight/Obesity</u>: The relevance of obesity to IHD is well summarized in the Titisee Report (Koenig, 1986) which reports that for many years life insurance data and some prospective studies indicated that obesity was a major risk factor for mortality due to coronary heart disease. Later, the role of obesity was questioned, as no strong correlation between overweight and atherosclerosis or its complications was found. In secondary prevention, there is no evidence that weight reduction of patients with prior myocardial infarction was followed by a reduction in mortality rate or in nonfatal reinfarction. Nevertheless, the following statement appears justified: Overweight alone is not a significant risk factor, but the correction of obesity is desirable because of its close relation to hypertension, hyperlipidemia, diabetes.

Kannel (1984) identifies an additional benefit of weight control - that of reducing dependence on drugs in the reduction of other coronary risk factors.

Psychological Factors: Simborg (1970) reviews early developments associating psychological factors with IHD and mentions in particular Osler's statement that in some individuals "arteriosclerosis seems to come as a direct result of high pressure life" (Osler & McCrae, 1920) and Dunbar's development of personality profiles in disease in the 1940's that included the coronary profile or personality (Dunbar, 1943). Then he reviews the major study of personality and IHD done by the Western Collaborative Group (Rosenman, Friedman, Straus et al, 1966) that established Type A as a risk factor in the development of IHD and reports that the total incidence of CHD was 3.4 times higher in those with personality Type A than with personality Type B. In the younger aged group the incidence in Type A subjects was 6.4 times higher. After 4 1/2 years, the overall incidence is 2.4 times higher in Type A, and 2.8 times higher in the younger ages with Type A. These relationships hold true independent of blood pressure, serum lipids, ponderal index or smoking. After 5 1/2 years, the cumulative death rate from CHD was approximately 6 times higher in Type B.

The pioneering efforts of Rosenman, Friedman and others were recognized in 1977 when the National Heart, Lung and Blood Institute (NHLBI) (Weiss, 1981) began a two phase comprehensive review and concluded with the statement that "the review panel accepts the available body of scientific evidence as demonstrating that Type A behaviour as defined by the structured interview used in the Western Collaborative Group Study, the Jenkins Activity Survey and the Framingham Type A behaviour scale - is associated with an increased risk of clinically apparent coronary heart disease in employed, middle-aged U.S. citizens. This risk is greater than that imposed by age, elevated values of systolic blood pressure and serum cholesterol, and smoking, and appears to be of the same order of magnitude as the relative risk associated with the latter three of these other factors".

This was qualified by three future concerns that:

1) More objectively quantifiable and replicable measurement techniques are needed.

- The similarities and differences between Type A behaviour and coronary prone behaviour in terms of both specificity and physiologic mechanism must be established.
- 3) Further studies are needed to provide an adequate population base in terms of race, age, socio economic status, cultural and sex variables to allow generalization of findings concerning Type A behaviour to the population as a whole.

Since then much additional research has been reported in terms of assessment (Crisp, Queenan & D'Souza, 1984; Ruberman, Weinblatt, Goldberg & Chaudhary, 1984) and intervention (Mumford, Schlesinger & Glass, 1982; Friedman, Thoreson et al, 1984; Frasure-Smith & Price, 1985; Oldenburg & Perkins, 1985) at the level of secondary prevention. The most definitive study of secondary prevention to date has been that of Friedman et al in 1984. In their Recurrent Coronary Prevention Project they succeeded in reducing Type A behaviour by 44% in the treated group compared to 25% in the controls, and this was associated with a reduction in cardiac recurrency rate to 7% compared with 13% for the controls (p<0.005).

iii) Risk Markers

Age and Sex: IHD is the most common cause of death among Canadian men over the age of 45. In 1982 it accounted for almost 1/4 of deaths among men in their early 40's and more than 1/3 in their early 60's. For women cerebrovascular disease causes proportionally more deaths from CVD until age 40 and then IHD becomes the major form of CVD and, by age 65 it is the most common cause of death. Men and women have very similar mortality rates for cerebrovascular disease. With MI the mortality rates are up to 8 times higher for men than for women in their early 40's, and remain 3 to 4 times higher until age 70 when men and women experience similar mortality rates. The greatest number of potential years of life lost before age 70 (PYLL) for men and women together, is from cancer and this is followed by CVD (Nicholls, Nair, MacWilliam, Moen & Mao, 1986).

Mortality rates in the first year following an initial MI reverse and are 20% for men and 45% for women, although much of the female mortality occurs early within the first month. The annual mortality rate for both sexes in this regard is 3 to 4 times that of the general population, and tends to decline with time after the MI. Sudden death accounts for more than half of the mortality (Kannel, 1984).

Reinfarction rates are also unevenly distributed with second MI occurring in 13% of the men and 40% of the women within 5 years. About half of these reinfarctions are fatal (Kannel, 1984). Thus men experience greater incidence and mortality rates from IHD until their mid sixties after which there is little difference between the sexes. However, after an initial MI women are more prone to reinfarction and death.

<u>Family History</u>: The fact that IHD shows familial clustering is well documented in Simborg's review (1970) although the question as to whether the influence is genetic or

environmental could not be answered from the available evidence. In his summary he reports that familial clustering is especially true in the younger aged persons with CHD. Slack and Evans showed that male relatives of male coronary patients under age 55 had a 5.2 fold increase in death from CHD compared to male relatives of a control group of the same age. Similarly, the female relatives had a 2.8 fold increase. The male relatives of female coronary patients under age 65 had 6.4 times the death rate from CHD experienced by the female relatives of controls. The female relatives of female coronary patients had a 6.9 fold increase. In a study of parents of medical students, Thomas showed that the prevalence of CHD among siblings of individuals with CHD was 4 times higher than among siblings of individuals without CHD. In the Western Collaborative Study, risk of CHD was 2.4 times higher in those subjects with a positive family history of CHD compared to those with a negative family history.

b) Clinical Manifestations

In Figure 1.1 clinical manifestations and consequential morbidity are presented separately to differentiate 2 levels of intervention: the first, acute intensive care in the hospital and the second, early rehabilitation in the home. Clearly there are many complications that can maintain a patient in an acute stage of the disease or return them to it during the process of rehabilitation, especially in phase I. For the purpose of discussion, however, movement from one stage to another will be considered as a direct progression.

The manifestations of IHD are sudden death, myocardial infarction (MI) or angina. Amongst asymptomatic men age 30 to 62 years, the first overt manifestations occur at approximately 1% per year and of these 13% present as sudden death, 7% as unstable angina, 38% as stable angina and 42% as MI (Oberman, 1980).

Sudden death, in general, accounts for 50% of all coronary deaths, occurs within an hour of onset of symptoms and takes place outside the hospital. Prompt community resuscitation measures have been reported to produce 66% resuscitation rates for ventricular fibrillation, with 14 to 25% survival rates after hospitalization (Oberman, 1980). The risk of sudden death can be assessed more accurately for individuals with known cardiac disease and this will be discussed under rehabilitation. Also of current interest is the fact that sudden death has been reported to occur without evidence of recent infarction or occlusion (Davies, 1977; Reichenbach, Moss & Meyer, 1977; Cobb, Baum, Alvarez & Shaffer, 1975), and may result from ventricular fibrillation related to a combination of ischemia and stress related sympathetic stimulation (Olsson, Rehnquist, 1982; Lown & Verrier, 1976).

In the first year, mortality rates are largely related to the degree of myocardial damage and coronary occlusion, and after that depend on a combination of these factors plus varying

effects from the risks identified in the section on antecedent morbidity. With regard to MI several studies have reported 30% mortality rates with left main coronary artery disease, 13 to 15% for three-vessel disease, 10% for two-vessel disease and 4 to 8% for single-vessel disease within one year without intervention. Risks are further escalated by evidence of increasing left ventricular dysfunction. Clearly such risk assessment is dependent on medical diagnosis, including invasive techniques. By using such assessment information in combination with information on antecedent risks, multi-variate risk profiles are evolving for the post infarction period (Kannel, 1984).

Myocardial infarction is clinically recognizable 75% of the time and is confirmed by ECG and enzyme changes. The remaining cases are silent or atypical and would be unrecognized except for ECG changes and possible enzyme changes. The majority of MI patients are stabilized after two or three days in coronary care and proceed to the early stages of rehabilitation. Case fatality rates during the acute phase vary greatly with the degree of myocardial damage and coronary occlusion but, with current monitoring systems, fatalities are now reported to average 15% (Kannel, 1984).

Unstable angina (also known as acute coronary insufficiency and preinfarction angina) is a term used to describe patients oscillating between stable angina and MI. Earlier studies suggested a 5 to 32% mortality rate within one year but more
recent studies report a 6% mortality rate, a 7 - 12% incidence rate for MI and 44% either free of angina or suffering infrequent attacks. However such information varies widely depending on the study population and definitions (Oberman, 1980).

Stable angina (angina pectoris) either can become disabling and require medical and/or surgical intervention or it may also disappear either temporarily or permanently even without treatment. Prior to coronary artery bypass surgery (CABG) the prognosis for stable angina differed little from that for MI with the exception that women were reported to have a better prognosis than men (Oberman, 1980).

c) Consequential Morbidity

The initial event of MI carries with it an increased risk of for other cardiac related events. Assessment of these risks has become increasingly accurate with greater use of invasive and noninvasive techniques that help anticipate events ranging from sudden death to quality of life concerns. Assessment strategies will be mentioned relative to the major physiological and psychological events that commonly follow an MI. Greater emphasis will be placed on noninvasive techniques since there is increasing reference to them in the rehabilitation literature.

i) Impairments and Disabilities

As impairments form the basis for disability in this framework of morbidity it is important to establish the degree of impairment present. The most common symptoms reported post infarction are pain, shortness of breath and fatique as well as feelings of anxiety and depression that manifest in many forms and are well described by Hackett and Cassem (1984) and Cay (1982, a). Underlying conditions, in particular congestive heart failure, angina and arrhythmias, are assessed with a variety of medical techniques and subsequently managed largely with medical and surgical interventions. Psychological manifestations are assessed through observation and interview as well as various tests. It is commonly reported, however, that physiological and psychological assessments stand independently of each other because the way individuals respond is independent of the physical severity of their situation (Cay, 1982,a; Hackett & This has been of particular concern in Cassem, 1982). rehabilitation with regard to such issues surrounding return to work, disability pensions, early retirement, alternate placements, reduced efficiency and employer discrimination, as well as the legal and ethical implications for professionals participating in the decision-making process (de Velasco, J.A., 1986; Naughton, 1984; Segall, 1984). Many other examples of the effect of such a discrepancy occur in the rehabilitation process and will be discussed in the context of behavioural morbidity.

ii) Behavioural Morbidity

Behavioural morbidity is assessed in terms of diseaseinduced behaviours that can be evaluated quantitatively and qualitatively. As mentioned the discrepancy between diagnosed physical impairment (diagnosed morbidity) and patient reactions (perceived morbidity) is often most obvious in relation to difficulties regarding employment situations but it also has other effects.

Hackett and Cassem (1982) note that the first response of most North Americans to chest pain from MI is to act such that the average delay is 4 to 5 hours before seeking medical help. This pattern of behaviour seems to bear no relationship to education level, socio-economic status, sex, history of previous MI, acquaintance with individuals who have had angina and cardiovascular disease or those who have been exposed to an educational program in which these principles are outlined. They suggest much of the delay is rooted in denial and the need to minimize fear. Understandably the same mechanism is used by a substantial proportion of patients in the post infarction stage.

Subsequent to an MI the extent of a patient's reaction to the event continues to remain independent of the severity of their physical condition (Cay, 1982a). Various suggestions have been made as to why such a discrepancy exists. Fear and anxiety have been mentioned as a basis for denial. Some suggest it chiefly reflects their usual style of coping (Cassem & Hackett,

1982). Others suggest it is the result of personality factors and/or continuing stress from prior psychosocial stressors such as occupational experiences and/or more than an average number of life events in the previous 2 years, particularly the final 3 months (Konig, 1986; Falger & Appels, 1982; Theorell, 1982). Although the various theories are not conclusive as to the cause of the discrepancy, it remains in itself an important factor in understanding lack of compliance and other reactions in the rehabilitation process.

Other manifestations of behavioural morbidity are well described by Cay (1982a) and Cassem and Hackett (1984). They describe a natural cycle of emotional upset following an MI that is characterized by decreasing anxiety at the time of hospital discharge, and increasing depression on return home. Although this cycle can be self-limiting, evidence shows that the emotional upset is severe in one third of the patients and, if not alleviated, can still be significantly disturbing for 25% of the patients more than one year later.

Stern (1984) reports that the first month at home is frequently the most critical in recovery. Expectations of physical recovery and rapid return to premorbid functioning are often contradicted by a reality marked by easy fatiguability and weakness, and by dietary, sexual and recreational limitations. Complaints frequently include nervousness, disturbed sleep, diminished appetite, tearfulness, social withdrawal, a sense of uselessness and pessimism about the future. This is confounded

by recommendations to make life style changes, any conflicting medical advice, side effects of medication and the reactions of family and friends that are frequently overprotective. Short term medical and psychological treatment is reported to be beneficial, with occasional psychiatric referrals for exceptionally acute short term reactions or for extended periods of severe reaction that could then qualify as impairments and/or disabilities. Interpretation and education in conjunction with early exercise testing and early participation in exercise classes is also reported to counteract this reaction which has been described as homecoming depression.

In summary it is evident that consequential morbidity requires a multifaceted assessment and that diagnosed morbidity will frequently not explain the patients' perceptions and reaction to their experience of MI. Early assessments are important to cardiac rehabilitation especially for early ambulation and decreased length of stay in hospital, when the process starts much sooner. Both psychological and physiological effects of MI have been described since the 1960's, but only recently has the impact of psychological factors been so frequently addressed both in terms of assessment and intervention and from the time of admission throughout the later phases of rehabilitation.

B. Cardiac Rehabilitation

The evolution of medical attitudes towards the recovery of MI patients has been dramatic in the last 30 years. Denolin (1986) and Wenger (1984) both recall that physical activity was not significantly limited for coronary patients in the 1700's and 1800's. However after MI was recognized as a clinical entity by Herrick in 1912 a period of marked restriction followed from the 1920's through the 1940's. Protracted bed rest of six to eight weeks in hospital was the mainstay of treatment, activity as strenuous as stair climbing was deferred for a year and return to productive work and normal living was This was supported by studies of the pathological unusual. process by Mallory (1939) and others that indicated a period of at least 6 weeks was necessary for healing of the scarred myocardium and development of collateral circulation. Denolin records a statement made by White in 1945 that advises "Acute coronary thrombosis must be regarded more seriously than most cardiac conditions, and rest in bed for weeks or months (a minimum of four weeks) should be prescribed in order to assure as sound a healing of the myocardial infarct as possible, with a very gradual and careful convalescence (a minimum of one month after beginning to sit up out of bed)...". Other similar quotes are provided.

A challenge to these restrictions came in 1944 when Levine drew attention to the fact that prolonged bedrest had unfavourable effects. In 1952 Levine and Lown demonstrated that

sitting in a chair 7 days after the onset of an MI was safe for the patient and had certain advantages. Thus, with the onset of the "chair treatment" the current emphasis in cardiac rehabilitation was borne although not widely accepted. Not until the early 1960's was there widespread use of early mobilization and since then the period of bedrest has been progressively reduced as well as the length of hospitalization. In contrast to 1960, when the average length of stay was 42 days, and in 1970 when it was 18 to 21 days, the average hospitalization now ranges from as few as 7 to as many as 14 days in the U.S. (Wenger, Hellerstein, Blackburn & Castranova, 1982). As mentioned earlier a similar trend has occurred in Canada.

Thus, although rehabilitation began starting much earlier, there was less time in hospital to progress to desired levels of activity and consequently, in the early 1970's, cardiac exercise programs were begun for patients after discharge. Phase II programs, designed for up to 4 months after discharge, were usually held in the hospital and Phase III or maintenance programs were held in the community. The earliest program in Canada began in 1967 at the Toronto Rehabilitation Centre under Kavanagh (Kavanagh, 1976). The expanded use of ECG's and the addition of radionuclide angiography has enhanced such programs Earlier prognostic stratification and more specific greatly. activity prescriptions are possible with early submaximal exercise testing at around the tenth day post infarction, with

ambulatory monitoring using the Holter monitor as well as with repeat exercise testing.

In their review Denolin and Wenger also report on the emphasis that has been placed on physical rehabilitation for many years and the present greater recognition of psychosocial factors. In the broadest sense psychosocial factors include issues surrounding compliance with medical regimes, risk factor reduction, family relationships and employment, and involve interventions that are largely psychological such as education and counselling regarding additional interventions, for example CABG, behavioural change techniques and self management. Recently a national survey (Sikes & Rodenhauser, 1987) was made of all U.S.hospitals with coronary care units to determine the prevalence of psychosocial rehabilitation programs for MI The results indicate widespread use of inpatient patients. programs involving patients and families in a one-to-one approach. Only half as many hospitals offered an educational/counselling program after discharge or made referrals to such a service. Three quarters of the post discharge services were provided on a one-to-one basis. Nursing was predominantly responsible for inpatient counselling. Both in and outpatient programs also involved social workers, dieticians, physical and occupational therapists, psychologists, psychiatrists, chaplains and technicians and these professionals formed interdisciplinary teams up to half the time. Mention is

made that none of the programs reflects involvement of the work place in rehabilitation to date.

Lamm (1986) reports that CVD gained slowly in the interest and concern of WHO but that by 1958 a cardiovascular disease unit was established. Subsequently, the first WHO Seminar on Cardiac Rehabilitation was held in 1967 and soon after that a definition of cardiac rehabilitation (WHO, 1969) was written that continues to be a valid and complete definition. It states that 'the rehabilitation of cardiac patients can be defined as the sum of activities required to ensure them the best possible physical, mental and social conditions so that they may, by their own efforts, resume as normal a place as possible in the life of the community. Rehabilitation should take place at an early stage and be continuous. The physician must bear it in mind from his very first contact with the patient and not lose sight of it in any phases of treatment or supervision. Every aspect of the patient must be taken into account in rehabilitation, including his physiological, clinical psychological and social problems. Lastly, rehabilitation cannot be regarded as an isolated form of therapy, but must be integrated with the whole treatment of which it constitutes only one facet'. If criticism were to be made it would address a lack of recognition for the increasingly responsible roles of other disciplines in both research and clinical areas. However, from the point of view of patient care, the definition is

comprehensive in terms of the current research and work in rehabilitation.

Since much of the work in rehabilitation has been established on an empirical basis there has been considerable emphasis in recent years on the evaluation of current programs as well as the initiation of randomized controlled studies of various interventions. Outcome variables in the early research were often limited to mortality and to morbidity in terms of reinfarction rates. Cay (1982,b) comments that the results of three multicentre studies focussing on exercise (American National Exercise and Heart Disease Project, Ontario Multicentre Exercise Heart Trial and WHO European Multicentre Study) would be a failure in these terms. However, indicators of decreased psychological problems and better social functioning were positive. If comprehensive rehabilitation is to be evaluated a variety of indicators are necessary, including mortality and morbidity.

Some recent studies that include psychological interventions have had effects on a variety of variables. Earlier reference was made to the reduction in Type A behaviour and reinfarction rates in the Recurrent Coronary Prevention Project (Friedman et al, 1984). A Canadian study, the Ischemic Heart Disease Life Stress Monitoring Program, (Frasure-Smith & Prince, 1985) reports a significant reduction in mortality although no reduction in rehospitalization rates. This involved monthly post infarction telephone monitoring of psychological symptoms of stress using Goldberg's General Health Questionnaire and, whenever a patient's score rose above a critical level, a visit to the patient's home by a project nurse. An Australian study (Oldenburg & Perkins, 1985) reported that educational and counselling interventions were significantly more effective than routine medical and nursing care on psychological and lifestyle functioning, and as well reported decreased symptoms of heart disease and increased levels of self management. An American study (DeBusk, Haskell, Miller, Berra & Taylor, 1985) evaluated the difference between medically-directed at-home rehabilitation and medically supervised group rehabilitation starting 3 weeks post infarction and found no difference in mortality, reinfarction or compliance rates. The authors suggest there are potential advantages in terms of increased convenience for the patients and improved communication with the nurse and physician regarding daily concerns.

These particular studies illustrate the use of a variety of indicators in evaluating the outcomes of cardiac rehabilitation. Some authors (Philip, A.E., 1982) stress the need to develop robust measures that can incorporate physical and psychological factors in a common framework while others (Cay, 1982, b) stress the need to develop new indicators that are more sensitive to the "softer but equally real" issues of quality of life. Marmot & Theorell (1982) conclude well when they state that "the profound changes in human environment and the utilization of a modern life style, where speed and constant competition are

dominating, have made coronary disease the social disease of our times and the plague of civilization. Psychological stresses cannot be differentiated from the general environment and cannot be isolated from diet, physical inactivity, high blood pressure, carbohydrate intolerance, high LDL levels and heredity factors. All these may influence the natural course of the disease... Further research on psychological factors should be based on a close cooperation between cardiologists, psychologists, sociologists and epidemiologists... All sides should be reminded that in our world, like in our body, there is no action without reaction, no life without stress, no gain without risk. The future will show whether a scientifically based solution can be found." At the end of the chapter recent ideas from the area of health promotion will be mentioned and their potential relevance to these rehabilitation concerns.

In concluding this section, factors important to the planning of rehabilitation programs will be mentioned. The type institution or agency will determine which phase of of rehabilitation is developed. Hospitals include Phase I and frequently Phase II in their services and these will be discussed first. Given the shortened length of stay, the end of Phase I may need to be provided on an ambulatory basis and certainly this is true for Phase II. For that reason, a guide in the American Hospital Association entitled "Hospital Ambulatory Care: Making It Work" (Wacker & Tseng, 1983) is useful in identifying important planning principles for Phase I

and II rehabilitation programs. Planning is divided into two stages, strategy formulation and strategy implementation. The participation of key individuals including administration, medical staff and the governing board is important in the initial planning stage as well as good timing and the right political climate. In the second stage of planning, participation of department heads, chiefs of staff and other mid level managers is important. Final approval must be given by top management regarding resource allocation, evaluation of objectives and delegation of management authority and responsibility. Although marketing strategies have not traditionally been considered in the Canadian Health Care system, ambulatory care services are dependent on physician referral and, in that sense, they must be marketed to physicians as useful, asccessible and accountable. Operational planning and budgeting will vary in detail but must include organization, management, manpower, costs and revenues. The manner in which all these matters are handled is important to the development of ambulatory care programs such as cardiac rehabilitation.

The community provides a base for Phase III programs and similar planning and implementation strategies can be adaptated for the organizations involved. Government and voluntary organizations are most frequently responsible for these programs as well as other community agencies, depending on the circumstances. Schlesinger et al (1986) present an interesting overview of government programs in Germany and Finland, and of business and industrial programs in the U.S. Goodwin (1986) describes the role of voluntary organizations and the active role of the National Heart Foundation of Australia in Guzman et al (1986) summarize a survey of 50 particular. centres in 33 countries that provides interesting information while recognizing limitations of the study in terms of generalizability and subjectivity. The study concludes that the present state of the art in cardiac rehabilitation can be simplified as being predominantly oriented toward physical training, being institutionally based (either as in or outpatient treatment) and being championed by motivated patients. Trends suggest that cardiac rehabilitation, in the future, should become more oriented toward quality of life considerations, be increasingly community based and championed by motivated and knowledgeable physicians.

In summary then, cardiac rehabilitation has developed as an independent but integrated aspect of cardiac care in the last 30 years. Approaches to rehabilitation have changed dramatically and the field is broadening with the inclusion of more psychosocial interventions. Rehabilitation services are provided by a variety of organizations, although no discussion of interorganizational planning and cooperation has been noted in the literature so far.

C. Current Concepts in Health Promotion

When WHO defined health as more than the absence of disease or infirmity in 1948, formal recognition was given to physical, mental and social wellbeing as the further dimensions of health. Operationalizing and subsequently measuring these aspects of wellbeing has occurred slowly. Recently WHO formalized further discussions on the concept of health with the establishment of a new program in Health Promotion in the WHO Regional Office for In discussions of the working groups Europe in 1984. (Discussion document, 1986) Health has been described as the extent to which an individual or group is able, on the one hand, to realize aspirations and satisfy needs, and, on the other hand, to change or cope with the environment. Health, then, is considered to be a resource for daily living rather than an endpoint of achievement and consists of an ongoing process of adaptation and adjustment. Cardiac rehabilitation clearly enables this process by limiting adverse consequences of acute illness, ameliorating symptoms and enhancing residual function. As patients acquire knowledge, confidence and skills they become increasingly competent in self management and, at some point, barring further complications, complete the process of rehabilitation and independently establish their own level of commitment to maintaining and promoting their general good health.

Health promotion, however, is rooted historically in health education and has usually functioned outside clinical boundaries in health care. The current concept describes health promotion as the process of enabling people to increase control over, and to improve, their health. It is based on five underlying principles stating that:

- 1. Health promotion involves the population as a whole in the context of their everyday life, rather than focusing on people at risk for specific diseases. It enables people to take control over, and responsibility for, their health as an important component of everyday life - both as spontaneous and organized action for health. This requires full and continuing access to information about health and how it might be sought for by <u>all</u> the population, using, therefore, all dissemination methods available.
- 2. <u>Health promotion is directed towards action on the</u> <u>determinants or causes of health</u>. Health promotion, therefore, requires a close cooperation of sectors beyond health services, reflecting the diversity of conditions which influence health. Government, at both local and national levels, has a unique responsibility to act appropriately and in a timely way to ensure that the 'total' environment, which is beyond the control of individuals and groups, is conducive to health.
- 3. <u>Health promotion combines diverse, but complementary</u> <u>methods or approaches</u>, including communication, education, legislation, fiscal measures, organizational change, community development and spontaneous local activities against health hazards.
- 4. <u>Health promotion aims particularly at effective and concrete public participation</u>. This focus requires the further development of problem-defining and decision-making lifeskills both individually and collectively.
- 5. While health promotion is basically an activity in the health and social fields, and not a medical service, health professionals - particularly in primary health care - have an important role in nurturing and enabling health promotion. Health professionals should work towards developing their special contributions in education and health advocacy.

Health promotion activities can be clustered by their focus on access to health, development of an environment conducive to health, strengthening social support networks, promoting positive health behaviour, and/or increasing knowledge and disseminating information.

In this broader sense, health promotion has relevance to issues in cardiac rehabilitation that involve alternate systems of delivery, interorganizational cooperation and consumer participation. Both these issues and the need for better indicators of well being are part of later discussions on the conceptual framework and methodology.

CHAPTER II: CONCEPTUAL FRAMEWORK

A. A Systems Approach

Evaluation is the final stage in the planningimplemention-evaluation process, in the same way that rehabilitation is in the diagnostic-treatment-rehabilitation sequence. Clearly none of the stages in either process occurs independently of the others, nor do events progress in an entirely linear fashion. In order to integrate these interrelationships two models based on the systems approach will be used as the conceptual framework for discussing the evaluation. Before discussing the two models, however, brief reference will be made to the systems approach and its characteristics.

The systems approach conceives of a living system as comprising a set of interdependent units that interact continually in order to maintain as nearly as possibly a steady state. Feedback is an essential part of the self regulatory process. When the effect of an external force is felt within the boundaries of a system it works to maintain a steady state by eliminating or counteracting deviations from the normal, or, it will at times permit increased deviation from the normal and allow subsequent change in the system. Thus a system is maintained in a state of dynamic equilibrium by a flow of information that is evaluated and interpreted into a unified response of some sort. Miller (1978) has recently developed the approach in detail from general systems theory and others have utilized the approach as a framework for discussing planning and evaluation (Blum, 1981) as well as conceptualizing health and illness (Feuerstein, Labbe & Kuczmierczyk, 1986; Milsum, 1984) and clinical practice (Sundberg, Taplin & Tyler, 1983). The systems approach is helpful in developing compact informational flow diagrams that can incorporate current data and insight and stimulate further useful questions. For the purposes of this study, it provides a basis for describing the developmental process of the program and helping to gain insight into the behavioural change processes of patients during rehabilitation. Although the approach does not lend itself to immediate mathematical treatment, it provides the opportunity to develop underlying methodological equations that can be the basis for further research and evaluation after an initial descriptive study such as this one.

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This study addresses two areas of interest regarding outcome for the cardiac rehabilitation program. First, the effects on the hospital in terms of decreased length of stay, and secondly, clinical effects in terms of the program's goals and objectives. The results regarding length of stay are of immediate concern to the administration in allocating future resources, while an independent follow up of patients' perceptions and related behaviour can provide information potentially useful in confirming or changing current program activities and/or planning for the future. As mentioned, two

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models are presented as a framework for the discussion: the first is a simple planning-evaluation model and the second a more complex model of health behaviour change. The first model serves to describe the whole evaluation process although greater emphasis is placed on the process of evaluating length of stay information since this is of immediate concern to all involved. The second model provides a theoretical framework from which to consider the various aspects of assessment that are included in following-up patients after rehabilitation.

B. Planning/Evaluation Model

A simple planning-evaluation model has been devised to indicate the role evaluation played when the cardiac rehabilitation program was first established and to discuss the experience as it occurred. Factors that were historically important in securing support for the program will be discussed in a description of the program in the next chapter.

Briefly, however, the program began at Lions Gate Hospital in December 1984 with temporary funding and administrative support from within the hospital. It was known as the Cardiac Early Discharge Service (CEDS) and was established as an ambulatory program in the Medical Day Centre (MDC). Achievement of permanent program status was chiefly dependent on acceptance and referrals from the medical staff, close cooperation between the Cardiac Care Unit (CCU) and Medical Day Centre and a reduction in the average length of stay. Implementation of the

program was a shared responsibility between the Medical Day Centre's coordinator and the program's clinical director. In turn program staff worked within a matrix system of responsibility and were accountable to the program director on clincial matters and to the MDC coordinator for administrative reports. Final decisions regarding further resource allocation rested with the hospital administration.

When the Medical Day Centre opened in February, 1980, there were 10 programs, and evaluation was the established function of a research assistant. However funds were not available to continue the evaluation component after 1981. When CEDS was established the need for evaluation was anticipated and plans were initiated by the coordinator of the MDC to involve a student from the Health Care Planning and Administrative Program in the process. Subsequently approval for student participation was granted by the hospital administrator and the medical committee at Lions Gate, and by the Ethics Review Committee at U.B.C.

Although initial arrangements were made for the evaluation in November 1984, the actual process began in August 1985 after the program had been functioning for 8 months. Length of stay data was assessed immediately and the first patients were invited to participate in the follow up process in September 1985. Patient participation was considered more appropriate at this point than earlier in the program since by then the service process had had time to become established. Consequently patient follow up continued beyond the first year of the program in order to obtain sufficient numbers. Throughout the evaluation there was close cooperation with the program staff and MDC coordinator. Length of stay data was analyzed, the results were reviewed by the clinical director of the program and the MDC coordinator, and then included in a year end report of the program to the hospital administrator. Subsequently further interim funding was arranged until the program became permanently established in the summer of 1986.

The planning-evaluation model (See Figure 2.2) shows evaluation as closing a feedback loop in the planningimplementation-evaluation process and indicates that outcomes rather than process variables are of primary concern. The flow of evaluation information on established programs would normally follow the broken line to MDC administration. However, as the program was in a demonstration phase, information from the evaluation was also directed to the hospital administrator. Thus the program was dependent on hospital administration at that point. Depending on administrative interpretation of the outcomes, the feedback could be a decision to maintain the steady state and continue the program, or, conversely to deviate and make changes that could range from eliminating the program to making substantial alterations to it. Whichever decision was made, reaction within the MDC would theoretically be to return to a new steady state as rapidly as possible to maintain continued equilibrium in all programs.



FIGURE 2.2: Planning and Evaluation Model

The diagram therefore provides a simple visual presentation of the MDC as a system of individuals interacting through their work in various programs. Equilibrium is re-established after initial adjustment to the new cardiac rehabilitation program. Informal evaluation is anticipated as a regular function of program management, and internal adjustments between and within programs are expected as part of maintaining a dynamic but steady state in the MDC. However, decisions made in the context of the larger system of the hospital provide the opportunity for the MDC to be externally influenced in an unknown manner. Given the capacity of individuals to anticipate such events, considerable mental and emotional adjustment and readjustment occurred throughout the last three months of the program which maintained an element of excitement throughout the evaluation process. Subsequently a decision was made to continue the Other ramifications could be identified by expanding program.

the diagram to integrate other systems, such as the CCU, into a model of interactions for the larger hospital system, including external factors such as political influences within the community and from the provincial government. However, for the purposes of evaluating CEDS, the system under study is the MDC and it is adequately represented by the simpler model.

C. Health Behaviour Change Model

A systems model was developed by Kersell and Milsum (1985) to integrate the influence of social, environmental, psychological and physiological factors on health behaviour change. Although it was developed around issues of primary prevention the model is adaptable to any stage of prevention and/or treatment that involves patient participation in behaviour change. The model focuses at the level of individual change and develops around four successive but interrelated sets of conditions (see Figure 2.3). The first set of conditions or external antecedents serve primarily as inputs to the second level or personal antecedent conditions. These relate directly to the individual and in particular to their health status. The third set of conditions include socio-psychological factors which combine input from the first two conditions with feedback from the last set, the behavioural conditions. The focus of the model is on the third level, the point at which many factors synthesize to determine whether or not change will be initiated. Health behaviour changes anticipated in the process of cardiac



Figure 2.3 Health Behaviour Change Model

ე ი rehabilitation fit easily within this model as well as the various types of morbidity discussed in Chapter One (Figure 1.1). Both of these will be described in relation to the variables of interest in the evaluation.

Evaluation of clinical aspects of the program was based on the program's goals and objectives, and on current information in the literature. Not all outcome variables were specified in the objectives although they were implicit in the experience of program staff. Some variables favoured pre-MI and post-MI assessment of behaviour change while others could only be assessed after the MI. If the study were developed with a comparison group of post-MI patients any of the variables could be potential indicators of the differential effects of having a cardiac rehabilitation program.

The majority of variables assessed in the evaluation cluster around health dynamics within personal antecedents of change and perception of self, health status and environmental factors in socio-psychological conditions. Behavioural changes were assessed in relation to antecedent behaviours described in personal health dynamics. The major variables will be described in the sequence of the diagram (Figure 2.3).

Family history of IHD and diabetes are assessed from within external antecedent conditions. Personal antecedents include occupation, employment status, age, sex, marital status and living situation, as well as indicators of personal health status that include the different aspects of morbidity. **Risk**

markers, those characteristics of an individual that are hard to change or control, emerge directly from the family history in terms of IHD and diabetes. Precursors, biological abnormalities preceding clinical symptoms, are affected by family history and include hypertension, hypercholesteremia, and diabetes. Risk factors, behavioural and/or other characteristics that are amenable to change, are also influenced by family and social history, and include smoking, physical inactivity, overweight/obesity and other coronary prone behaviours. Τn addition to risk markers, precursors and risk factors as indicators of antecendent morbidity, patients also display characteristics of consequential morbidity that are a result of previous medical events and/or subsequent to their present MI. Previous history of MI or related events are assessed, and symptoms such as pain, shortness of breath and fatigue are included as impairments if substantiated with medical evidence; otherwise they are arbitrarily included with behavioural morbidity. Behavioural morbidity then includes reports of feeling unwell physically, feeling anxious and/or depressed and experiencing disturbed patterns of work, recreation and rest. Return to work, adequate sleep patterns, favourite activities and driving are included to complete the assessment of personal health dynamics.

The third set of conditions includes information about patients' perceptions regarding their predisposition to MI, their plans and confidence in changing specific behaviours such

a smoking, dietary habits and exercise, and their perceptions of the effect of the rehabilitation process. Evidence of discrepancies between patients' overt reaction to MI and the severity of their condition is also included. In the final set of conditions behavioural changes are specifically related to compliance with current treatment recommendations, prevention of future recurrences (for example, smoking cessation) and an increased sense of well being (for example, improved quality of rest or relaxation).

Thus the model provides an opportunity to consider, within one framework, both assessment and outcome factors that are important in evaluating the clinical effects of the program. Clearly, each patient is influenced by a multitude of factors and must consider more than one change in most cases. However, while each individual process is complex, simpler group measures of specific behavioural outcomes are valuable in assessing the effects of the program.

CHAPTER III: PROGRAM DESCRIPTION

A. Historical and Political Context

Establishment of the MDC at Lions Gate Hospital was an important chapter in the history of the hospital's development as well as an essential factor in planning for the Cardiac Early Discharge Service (CEDS). Highlights of the hospital's growth and development follow to provide further insight into the origins of CEDS which is a unique service, as judged from the literature reviews. Carswell (1980) recalls the early origins of the first Hospital Society for North Vancouver in 1920 and their negotiations with the City of North Vancouver and the districts of North and West Vancouver to build a hospital on the Many events followed culminating in the North North Shore. Vancouver General Hospital as a small acute care hospital. Subsequent population increases pressed hospital services beyond their capacity and the present seven storey structure was built, opening in 1961 as Lions Gate Hospital. Next door, at the old hospital, renovations enabled the building to serve as an Activation Unit with 25 rehabilitation beds as well as a separate psychiatric ward. From this location ambulatory day services began: in 1966, Diabetic Day Care; in 1973, an Obesity Clinic and programs for Chronic Obstructive Lung Disease and Activation of Coronary Patients; and in 1971, Psychiatric Day Elsewhere in the hospital, daycare surgery began in 1968. Care. Meanwhile all floors in the new hospital had been activated by

1967, and in 1971 an additional 169 extended care beds were opened in a separate unit. Service departments were overloaded. However, hospital expansion had peaked in the 1960's, and in 1969, Task Force Reports on the Cost of Health Services in Canada were recommending a shift toward the development of alternate forms of care and a broad range of ambulatory services. The Provincial Ministry of Health was receptive to such requests and when Lions Gate Hospital was funded to expand their central services in 1978 plans were also underway to build the Medical Day Centre within a second phase of development. Subsequently the MDC opened in February 1980 to house a wide range of ambulatory services that now includes 6 programs classified as Daycare, 3 as Short Stay Services and 2 as Outpatient.

The CEDS program was supported by hospital administration, MDC administration, physicians, and CCU and MDC staff. One internist was particularly instrumental in establishing the program after founding the original Coronary Activation/Cardiac Exercise Program. He obtained funds from the B.C. Health Care Research Foundation to confirm previous studies that early discharge of selected post infarction patients was not associated with increased incidence of complications. The study also served as a small demonstration program and gained the confidence of referring physicians in 1981 and 1982. When the program was re-established in December 1984 through internal hospital funding the same physician served as clinical director.

Many of the elements identified as essential to strategic planning in Chapter I (Wacker & Tseng, 1983) are evident in the developments just described. There was internal support from key decision makers in administration and amongst physicians, as well as external support in terms of timing and an appropriate political climate for the MDC and later the CEDS program. Implementation was dependent on a specific set of criteria: first, it needed to relieve pressure on acute beds, provide alternatives to residential institutional care and improve or at least maintain a patient's level of function; second, it must be supported by appropriate departments; third, a physician must be the clinical director of a program; and fourth, each program must have an approved budget and cost centre responsibility (Corbett, 1980). Finally, evaluation was included as a required part of the process.

B. Articulation of the Program

Programs in the MDC are designed to release pressure on inpatient services as well as to meet perceived needs of the patients in the community. Prevention is emphasized and there is a large educational component based on the underlying belief that increase in knowledge and changes in lifestyle will increase health status (Young & Romilly, 1981).

Three goals are identified for the Cardiac Early Discharge Program:

1) To reduce the number of patient days in hospital;

- To supervise medication, safe progression of physical activity, vital signs and other orders; and
- 3) To organize the patient as required for home care, self care and an organized exercise program.

These goals are implemented by an experienced cardiac nurse specialist who combines her technical skills and knowledge to supervise, educate and counsel patients in the community setting, and to establish an effective rapport with the referring physicians. The majority of her time is spent with patients. After the urgency of acute care treatment subsides, she shifts the emphasis of rehabilitation to the daily adaptations that are required of patients at home and at work after an MI. Since patients commonly suffer from anxiety and/or "homecoming depression" at this time, the nurse intervenes in various and unique ways with each patient. Ultimately she provides an opportunity for them to develop their own selfmanagement skills for the future. In the remainder of this section her activities will be described in more detail as they relate to the goals of the program.

Patient centred activities begin with an initial period of hospital liaison each day. In the CCU reports are shared with physicians and nurses, referrals are accepted and patients are introduced to the program. Referrals are completed by the attending physician and patients sign a consent form when accepting service.

Suitable patients are selected on the basis of their willingness to participate, their diagnosis and their area of residence. The majority of patients are diagnosed as having an acute MI which is confirmed by 2 or 3 of the following: ECG abnormalities, elevated enzyme levels and a compatible history. Occasionally patients with other diagnoses such as unstable angina are accepted into the program. All patients much reside in North or West Vancouver and, preferably, not live alone. In addition they clearly need to have the capacity to participate in early ambulation and progressive activity. If they don't have the capacity due to age or other infirmity, appropriate referrals are made to other nursing services.

Upon referral, nursing services are scheduled to begin within 48 hours of discharge and to include 3 visits in the first week, 2 in each of the next 2 weeks and 1 per week in the last 3 weeks. Initially emphasis is placed on activating patients and monitoring their use of medications. On each visit patients walk in their neighbourhood with the nurse for progressively longer times or distances. In addition to checking their vital signs before and after walking, the nurse uses the monitor from the portable defibrillator to obtain a stationary ECG reading on return from their walk. If concerns arise she forwards the ECG recording with her written comments to the attending physician. Such supervision provides the opportunity for early intervention if problems arise, as well as the opportunity to use biological feedback as required in

teaching patients about their condition. On the days between visits, patients are instructed to maintain the same exercise pattern that they have established with the nurse and to monitor their own pulse rate.

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The majority of patients take 2 or 3 different medications, in particular, beta blockers, calcium inhibitors, vasodilators and antiplatelet agents but also antiarrhythmics, diuretics, anticoagulants and other noncardiac medications. The nurse monitors the patient's compliance with the prescribed regime and any effects of the drug as well as teaching patients the name, the purpose and the side effects of each medication. Other issues are discussed, such as the need to keep a fresh supply of nitroglycerin and to understand the effects of alcohol in combination with specific medications. Time is taken on each visit for careful reporting of between visit exercise patterns and medication use.

Dietary adaptations and smoking cessation are also emphasized on the initial visits. While in hospital all patients and their partners receive written dietary information and an individual visit from the dietician to discuss general recommendations for cardiac patients. At home the nurse reiterates the information and helps patients adapt it to their personal tastes and routines. If hypercholesterolemia or hypertension are subsequently diagnosed, referral is made to the nutritionist in the MDC for further counselling.

Smokers are encouraged to continue the period of cessation that has been enforced by their hospitalization. If this fails, encouragement is given to greatly reduce their intake of cigarettes and to plan a date for quitting in the near future.

Throughout the visits patients are observed for evidence of anxiety, depression and denial. Interventions are as direct and simple as possible. The problems are acknowledged and patients are encouraged to discuss their experiences and accept immediate short term solutions. If the problems are severe referral is made to their attending physician. If the problem appears to be a chronically stressful approach to life, then referral is made for individual or group counselling for stress management and relaxation training.

Delivery of the service includes spending as much time with the patient's partner as necessary to deal with their concerns and reactions to the patient's MI. Frequently this involves resolving issues of interpersonal conflict arising from uncertainty and fear in both partners as well as the provision of practical advice on matters such as changing patterns of eating and food preparation.

After completing service with CEDS, patients are encouraged to complete a written evaluation and return it to the MDC by mail. They are also invited to contact the nurse as necessary for further information. Informal communication frequently continues when the patients are in the hospital for stress

tests, the cardiac exercise class and/or the occasional lecture or evening presentation on MI sponsored by the hospital.

Establishing an effective rapport with physicians is necessary for the ongoing success of the program. As a routine, all referring physicians receive written progress reports at the midpoint and at completion of their patient's period of rehabilitation. During service they are consulted by the nurse whenever medical problems arise and also, when the nurse identifies an opportunity to facilitate better communication between the physician and their patient. Throughout, the nurse's level of expertise and ease of communication are fundamental to the process of establishing and maintaining a high referral rate.

C. Implications for Evaluation

Many possible purposes can be served by evaluation, so that it is important to determine, in the beginning, what functions are to be served in a particular case. Cronbach and Associates (1980) condense many years of experience into "Ninety Five Theses" on evaluation and discuss the current trends of evaluation in detail. They stress that the proper mission of evaluation is "to facilitate a democratic, pluralistic process by enlightening all the participants". The results of an evaluation will not substitute for the political process but will be incorporated into it and must provide relevant information for those in decision making positions.
Determining the purposes of evaluation was not difficult at Lions Gate since goals for the MDC and the program had been clearly identified. Being in the initial stages, the program was directly accountable to the hospital administration for reducing the use of inpatient services, and to physicians for securing referrals. Ultimately the program was also accountable to other professionals, the patient and their families and the general body of knowledge supporting the program in terms of clinical effects. **Purposes of the evaluation** were, therefore, identified in consultation with the MDC coordinator, the clinical director and the cardiac nurse specialist. They were:

to provide information that will be useful in determining whether or not the program will become permanently established within the hospital;

to provide information that will enhance understanding of the program between disciplines and departments within the hospital; and

to provide information and recommendations that can be used to help shape future directions of the program.

Within the consultative process it was also determined that length of stay data would be the dependent variable of first concern in the evaluation and that indicators of clinical effects would be developed by the cardiac nurse and the evaluator. Developing indicators of clinical effects was difficult since the program goals were comprehensive in addressing the general activities of an early cardiac rehabilitation program. Clinical judgement was required in each situation and the program was tailored to the needs of individual patients. Thus it was important to select indicators that would assess changes across all patients in the group, and to maintain a focus on outcomes relevant to program goals rather than individual goals tailored to the clinical situation. Details are discussed further in Chapter IV, but suffice to say, defining the difference between clinical and program evaluation was difficult and, at times, arbitrary. Ultimately the choice of clinical variables was limited to those most directly related to general outcomes identified by the goals of the program.

CHAPTER IV: DESIGN AND METHODOLOGY

The present evaluation comprises a descriptive study of the effects of CEDS on hospital services for inpatients and on health related behaviours of patients in the program. Each area of outcome is evaluated differently and, therefore, will be discussed in separate sections of the chapter.

The study involves a 3 month planning phase, an 8 month phase of data collection and a subsequent phase of analysis, review and writing. Data collection for each area of the study began in the eighth month of the program and was completed 5 months later when the last patient received their follow up interview. Some results regarding decreased length of stay were immediately included in the first year-end report of CEDS to the hospital administrator. A few months later the program was given permanent status in the MDC and, with that, an opportunity was provided for the MDC to use other results of the evaluation as needed for future planning.

A. Evaluation of the Effects on Hospital Services

As mentioned earlier, length of stay was identified as a key variable for program evaluation by all concerned with CEDS. Consideration was also given to the use of readmission rates and alternate usage of cardiac beds. However, these latter two variables were not included in the study because a method for monitoring readmissions was not available in the Department of

Medical Records nor was a monitoring system available for tracking alternate bed usage on a ward basis. Length-of-stay is, therefore, the single dependent variable used to evaluate the effects of CEDS on other hospital services.

The rate of physician referral was identified as the most important independent variable since physician referral was required for admission to CEDS. Cooperation between the nurses in CCU and CEDS was also recognized as an important factor in facilitating early referrals.

For the evaluation, data was collected from the Medical Records Department by diagnostic category and used to establish the total population of patients hospitalized with MI during the first 10 months of CEDS, their individual length of stay and their disposition on discharge from hospital. All patients included in the total population were categorized as having either a complicated or uncomplicated MI as their most responsible diagnosis at discharge. Patients identified as eligible for CEDS were separated from the total population of MI patients and used in determining the rate of physician referral. One set of patients, those living out of the area, were identified as a comparison group to be used in evaluating the length of stay data on CEDS patients. Otherwise length of stay data was described as the average length of stay for successive groups over a 10 month period.

Differences between the average length of stay for patients in CEDS and patients living out of the area were analyzed using

a t-Test for differences in the means of independent observations. Length of stay data for the initial 10 months of the program was grouped for the first 3 months, the second 3 months and the last 4 months. Within each of these groups data was classified separately for patients with complicated and uncomplicated MI in both CEDS and living out of the area. Differences in the average length of stay were also compared between groups classified as complicated or uncomplicated MI within each time period, based on the null hypothesis that there would not be a significant difference between any of the groups.

B. Evaluation of Clinical Effects

A range of variables are used to describe and evaluate the clinical effects of the program using a sample of 40 patients. The variables were selected after reviewing the program goals and the rehabilitation activities as they are described in the previous chapter. The outcome variables of immediate importance to the program evaluation are exercise levels, dietary practices, cigarette smoking, compliance with medication regimes and client satisfaction. The program itself is treated as the independent variable. The descriptive variables include the precursors (hypertension, hypercholesterolemia, diabetes), the other risk factors (overweight, coronary prone behaviour) and the risk markers (age, sex, family history of diabetes or MI, personal history of previous cardiac events) categorized as

antecedents on the Health Behaviour Change Model (See Figure 2.3). These variables are considered to intervene primarily at a physiological level but, also, become part of the patient's personal perception of their health status. Data on 7 of the variables (blood pressure, cholesterol, diabetes, family history, obesity, smoking and exercise) is analyzed by use of the Health Hazard Appraisal System and 2 individual appraisals of risk are provided for each patient: one, based on the patient's report of pre infarction risks; and the other on their report 3 months after MI.

Other descriptive variables, categorized as sociopsychological factors on the model, are considered to intervene at a cognitive level, and include the patients' perceptions of their predisposition to MI and their current health status as well as their beliefs and plans about following recommended health behaviours. Evidence of denial, anxiety or depression, the disturbance of normal functions and interpersonal conflict are included with the reports patients provide about perceptions of their health status. These variables are included to further understand the personal experience of many patients and, also, to describe some of the intervening factors that influence the course of events for the nurse delivering the service.

Variables were operationalized in consultation with the program staff and piloted verbally, in a series of phone calls to patients who had completed service with CEDS in the first 8 months of the program. Subsequently, a written questionnaire

and interview was developed to be administered to a sample of patients recruited from the later admissions to CEDS.

A single group design was utilized and patients completed a pre and post assessment using the same questionnaire on 2 separate occasions, once approximately 1 week after MI and, again, approximately 12 weeks later. A structured interview was included at the time of completing the second questionnaire and this was usually done in the patient's home or, if the patient preferred, in the MDC.

A sample of 40 patients was recruited over a 5 month period from 65 sequential admissions to CEDS. Eligibility was based on a diagnosis of MI, the lack of a language barrier and willingness to participate. Of the 65 admissions, 15 patients were ineligible (7 due to diagnosis, 5 due to language, 3 due to unwillingness), 2 patients died, 3 moved out of the area and 5 were missed for recruitment. There was no loss to follow up.

Outcome variables regarding exercise and dietary practices were analyzed for significant differences between pre and post assessment. Variables were assessed either on an interval scale or on an ordinal scale. Interval data was tested with a paired t-Test for dependent observations with a one directional hypothesis. 40 pairs of reported observations were taken from pre and post assessments on each variable and tested to determine whether or not they increased or decreased significantly in the desired direction. Ordinal data was tested with the Sign test. All patients with an increase or decrease between pre and post assessment were included in the test. Each pair of pre and post observations were assigned a positive or negative value and the number of changes in either direction tested for significance.

CHAPTER V: RESULTS AND ANALYSIS

Results of the evaluation are presented in order of their initial importance to those involved in the consultative process at the hospital. Analysis is included with the results in the first and third sections. Results in the first section are concerned with the effect of CEDS on hospital services and focus on physician referral rates and length of stay data for CEDS patients. Length of stay data is described for successive groups of CEDS patients over a 10 month period and compared with a separate group of patients hospitalized with MI during the same period of time at Lions Gate Hospital. Patient characteristics described in the second section include information on demographic factors and antecedent factors to do with prior risk for MI. The information helps to describe the population of concern and some of the issues addressed during the rehabilitation process. Some of the data is used again in the last section to provide risk appraisals. In the third section the clinical effects of CEDS are described and the results given regarding pre and post assessments of exercise and activity levels, dietary practices and cigarette smoking. Additional information is provided regarding patients' compliance with medication regimes and satisfaction with the The fourth section provides further descriptive program. information about socio-psychological factors that are considered to intervene in the process of rehabilitation. In

the last section, a summary of the results from individual risk appraisal is provided. The appraisals are produced through the use of the Health Hazard Appraisal System.

A. Effect of CEDS on Hospital Services

1. Physician Referrals

Admission to CEDS was dependent on physician referral and from the start of the program physicians were cooperative about referring their patients. In the first 10 months, 6 cardiac specialists and 55 general practitioners referred a total of 91 patients to CEDS including: 74 with acute myocardial infarction; 12 with unstable angina; and 5 in special circumstances. The 74 patients with MI represent 92% of the MI patients considered to be eligible for the program while the remainder represent additional requests for service. Further details follow regarding the total population of patients hospitalized with MI and their alternate outcomes during the 10 month period under study.

According to the discharge summaries in Medical Records, 187 patients had a discharge diagnosis of MI in the 10 month period under study. From this population, 85 were considered eligible for CEDS according to diagnosis, discharge status and area of residence. Of the remaining 102, 57 died while in hospital, 22 were transferred to other institutions and/or had other complications, and 23 resided outside the boundaries of North and West Vancouver. Of the 85 patients identified as being eligible for CEDS, only 74 were reported to be in the program, which left an apparent loss of 11 patients. In 5 cases the cardiac nurse identified reasons for lack of referral including an immediate need for further medical procedures, illness in the supporting partner, and inappropriate living arrangements. The circumstances of the remaining 6 could not be clarified possible due to misclassification of eligibility through Medical Records information and/or slippage in the process of matching documentation in Medical Records with patient lists maintained on the ward. Assuming, that 80 patients remained eligible for the program, then physicians referred 92% to the program. Expressed differently, the program appeared to be appropriate for 57% of the patients surviving an MI, and the great majority of these individuals were referred to the program.

As mentioned additional referrals were accepted to the program and these included 12 patients hospitalized with unstable angina and 5 patients with cardiac conditions that were not hospitalized at Lions Gate but lived on the North Shore. The latter 5 included 2 postoperative patients that had just had open heart surgery at St. Paul's Hospital; 1 patient returning home from vacation having suffered an MI one week earlier; 1 patient returning home after hospitalization for MI elsewhere in Vancouver; and 1 patient with chronic disability due to threevessel inoperable cardiac disease. Although the program focussed on MI, it was agreed by those responsible that other

cases requiring cardiac rehabilitation would be accepted if time was available while the program was becoming established. Therefore, as mentioned, the program received 74 referrals for MI, 12 for unstable angina and 5 for special circumstances with a total of 91 patients referrals.

The high rate of referrals can be attributed to several the program was initiated by a well-known cardiac factors: specialist; it was established in the hospital with the support of other physicians; the patient's personal physician remained in charge although the program operated under the clinical leadership of a cardiac specialist; and further, the program services were provided by a nurse who was well-known and respected as a cardiac nurse specialist within the hospital. When asked to respond with a written evaluation of the program each of the 6 specialists responded positively. They reported satisfaction with their professional relationship to the program and with the reports that patients brought to them of the service. They wanted the program to be continued and had no specific suggestions regarding changes or improvements.

Interdepartmental cooperation between the cardiac nurse from the MDC and the CCU staff was also considered an essential factor in facilitating referral to the program. Cooperation was observed in terms of open communication and ease of access to the staff, facilities and necessary information. Initial cooperation can be attributed to the fact that the nurse providing CEDS had just transferred from CCU and was well

respected and liked as a staff member. However, maintaining the same level of cooperation will be equally important to the program when it is permanently established and/or when staff changes occur, according to the coordinator of the MDC and program staff.

2. Length of Stay in Hospital

The goals for reducing the average length of stay (ALOS) for CEDS patients in 1985 were achieved. In 1984 the ALOS at Lions Gate for all patients with MI was 15.2 and 10.6 days for complicated and uncomplicated MI's respectively. In 1985 the goal for CEDS was to reduce the ALOS for complicated MI's when possible and to achieve an ALOS of 8 to 9 days for uncomplicated MI's. The results (Table 5.1) confirm a downward trend for all MI's over the first 10 months of the program and an ALOS of 8.6 days for uncomplicated MI's in the final 4 months.

Over the 10 months, CEDS patients averaged 12.8 days (complicated) and 9.0 days (uncomplicated), while the ALOS for all patients in Lions Gate with MI was 17.4 days (complicated) and 10.8 days (uncomplicated). The difference is attributed to the effects of CEDS as well as a selection bias with CEDS patients since CEDS excluded patients who were often older and/or had other complications.

TABLE 5.1

AVERAGE NUMBER WITHIN CEDS	OF DAYS LENGT DURING THE IN n=74	TH OF STAY FOR MI TITIAL 10 MONTH PE	PATIENTS RIOD
	MONTHS <u>1 - 3</u>	MONTHS <u>4 - 6</u>	MONTHS 7 - 10
COMPLICATED MI n=18	12.8	14.7	11.0
UNCOMPLICATED MI n=56	9.7	8.9	8.6

In order to later compare the effect of CEDS, another group of patients were selected that were also in hospital with an MI during the 10 month period but, due to living out of the area, were excluded from CEDS (Table 5.2). Complicated and uncomplicated groups were compared within the same time periods and the data tested with a t-Test. There was no significant difference between the 6 groups with 1 exception, namely, the difference between complicated cases in the 7 to 10 month period (p<.002). The reasons for this are unclear since there was insufficient information on out of area patients to reach a conclusion. However, since the average length of stay for both groups remained below that for comparative hospital data in previous year, it is surmized that physicians may have adopted the practice of early discharge for out of area patients also.

It is unknown whether or not patients referred to other services such as Home Care.

TABLE	5.	. 2
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AVERAGE NUMBER OF HOSPITALIZED W OF CEDS	DAYS LENGTH NITHIN THE IN BUT RESIDING n=23	OF STAY FOR MI ITIAL 10 MONTH PE OUT OF THE AREA	PATIENTS RIOD
	MONTHS <u>1 - 3</u>	MONTHS <u>4 - 6</u>	MONTHS 7 - 10
COMPLICATED MI n=8	13	23	20.6
UNCOMPLICATED MI n=15	8.3	9	9.3

In addition to reducing the ALOS for hospitalized patients, CEDS reported accepting 5 patients who were in special circumstances. By accepting one of these referrals an admission to hospital was avoided. Although monitoring non-admissions was not considered a feasible indicator for the future, the information was incorporated with the other data to calculate the potential number of bed days saved during the 10 month period. Projected savings were estimated by the MDC coordinator and found to be \$50,000 or twice the cost of the program. Although a cost analysis was not a goal of this evaluation, the calculations were made as part of the year end report to the hospital administrator.

B. Patient Characteristics

1. Demographics

Characteristics described in this section are useful in understanding the patient population in terms of their home environment and their daily lives, and the delivery of a rehabilitation services in the community. For most patients these characteristics remained unchanged after their MI. However, depending on their circumstances, a variety of concerns were expressed by patients about having or wanting to change some of these fundamental aspects of their life after their MI, including, for example, their employment or marriage commitments.

In general the patient population was characterized as male with an average age of 60 years. Females averaged 64 years of age. Most patients were married, resided in a single dwelling, and had grown children . Half of the patients were employed at the time of MI and of the remainder, one quarter were already retired. Further details are included since differences were more important than generalities to the various activities of rehabilitation.

As mentioned, 77% of the study population was male with an average **age** of 60 years while the female patients averaged 64 years of age. Men ranged in age from 34 to 89 years, and women range 54 to 75 years of age.

The majority of the patients were **married** (33) and the remainder divorced (3), widowed (2) or never married (2). Most

of those who were married lived alone with their spouse (27) while the others (6) also had children at home. 5 of the unmarried patients lived alone, 1 with an elderly parent and 1 with a friend. The majority of patients lived in **single dwellings** (27) and the remainder in apartments, nearly all of which were located on hills due to the geography of the North Shore. At times that presented difficulty when walking. Several patients expressed pleasure at being in one particular complex of high rise apartments that provided an opportunity to meet other "heart patients" while walking in or outdoors with easy access to a large shopping mall on cold or rainy days.

At the time of their MI, 21 patients were employed full time and 3 part time, 11 were retired, 1 was unemployed and on social assistance, and 4 were involved full time at home. All full time employees were male, 11 of them over 60 years of age, 6 of them between 50 and 60 years and 4 of them between 34 and 47 years old. Women held the positions of part time employment, and full time involvement at home. (4 of the retired men had also secured part time employment). The group of retired patients comprised 9 men and 2 women, while the unemployed patient was male and had chronic schizophrenia.

Up to that point in their lives, 30 men and 2 women had been employed on a full time basis for most of their lives, 3 women had been employed on a part time basis, 4 women had been full time at home and 1 man had been unemployable. Their primary careers were reported as management by 8 patients,

private enterprise by 8, professional services by 5, skilled labour by 5, sales by 3, armed forces by 3 and homemaking by 8.

2. Antecedent Risks for MI

The majority of the antecedent risks are physiological and/or behavioural, including hypertension, hypercholesterolemia, obesity, smoking, lack of physical activity and family and personal history of diabetes and MI. Characteristics of the group are described since they are important to later reports of risk appraisal as well as to the patients actual and perceived health status.

24 patients were identified as having some degree of hypertension (140/90 or higher), 9 as having elevated cholesterol levels (\geq 250 mgm/%) and 18 as being overweight prior to their MI. Of those with hypertension, 15 reported taking medication. Again of those patients with hypertension, 7 were also identified as those having elevated cholesterol levels (250 mg/% or higher), 11 as those being overweight by 20 to 65 pounds, and 7 as having experienced previous cardiac events.

14 patients reported themselves to be current **smokers** at the time of their MI and 17 to be exsmokers, 6 having quit more than 10 years ago, 9 from 1 to 10 years earlier and 2 within the year prior to their MI. All current smokers preferred cigarettes except one man who smoked 10 to 12 pipefuls daily.

Approximately half the patients were physically inactive

during the day (sitting or standing) and 37% reported getting 0 days of walking or other light **exercise** each week.

8 patients reported a **family history** in which 1 or both parents died of an MI before age 60.

2 patients reported family histories of diabetes in a parent or sibling, and 1 of these 2 personally reported having diabetes. Altogether 5 patients report having **diabetes**, one having been diagnosed during hospitalization for MI. 2 of the patients were poorly controlled.

Previous cardiac events were reported for 12 patients and included: 4 patients with angina (2 unstable); 6 with MI (3 having had 1 MI, 2 having 2, and 1 having 4); 2 with cardiac arrests; and 1 with CVA. 2 of these 12 patients also reported having had previous coronary bypass surgery and one an endarterectomy.

C. Clinical Effects of CEDS

The following results are the outcomes of importance in evaluating the CEDS program. Reports of pre and post assessments on exercise and activity levels, dietary practices and cigarette smoking are given as well as follow up reports of compliance with medication regimes and satisfaction with the program.

1. Effects on Exercise and Activity Levels

Frequency of exercise

Overall, 65% (26) of the patients reported an increase in the weekly amount of light exercise that they gained, especially from walking, after their MI and subsequent early rehabilitation program (Table 5.3). At follow up 84% of the patients (32 of 38) reported walking 30 minutes or more for 5 to 7 days per week in contrast to 47% prior to MI. Further, 0% reported no exercise at follow up whereas 37% had reported this lack of exercise before MI (Table 5.4). These increases in exercise were significant on a paired one tail t-Test, t=5.14, 40df, p<.0005.

At follow up, 35 patients reported having had stress tests and of these patients, 27 reported an invitation to attend the cardiac exercise program at Lions Gate. Of the 27 invited patients, 16 reported attendance at the class. The remaining 11 felt they were getting enough exercise on their own and/or were unable to come at the scheduled times due to work or transportation. Of the 8 patients who did not report an invitation to attend the exercise program, 4 were undergoing further testing and 4 were not aware of the program.

TABLE 5.3

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FREQUENCY O	F LIGHT EXERCISE BEFOR	E MI BY TYPE OF CHANG n=40	E REPORTED AT FOLLO	W UP
DAYS/WEEK OF Exercise <u>Before Mi</u>	NO. OF PATIENTS REPORTING A <u>DECREASE</u>	NO. OF PATIENTS REPORTING AN <u>INCREASE</u>	NO. OF PATIENTS REPORTING NO <u>CHANGE</u>	TOTAL
7	3	N/A	3	6
6	0	1	2	3
5	2	6	2	10
4	0	3	0	3
3	0	1	0	1
2	0	2	0	2
1	0	0	0	0
о	N/A	13	2	15
	5	26	9	40

TABLE 5.4

FREQUENCY OF LIGHT EXERCISE BEFORE MI AND AT FOLLOW UP $n=38$ *					
		DAYS/ 5 to 7	WEEK AFTER 2 to 4	R MI 0 to 1	
DAVS /WEEK	5 to 7	17	2	0	19
BEFORE MI	2 to 4	6	0	0	6
	0 to 1	9	4	0	13
		32	6	0	38

* 2 patients physically incapacitated at time of follow up.

Levels of daily activity

After their MI, the 8 patients who had reported being in the heavy work category, all reduced to the 2 middle levels of activity (standing and walking, with or without climbing stairs or carrying light loads), while the 5 who had reported the least activity (usually sitting, not walking much) remained in this category. In consequence, the 2 middle categories had a combined increase from 67% to 87%. Reduced activity was expected for patients in the heavy work category at this stage of recovery. However, an increase in light exercise was expected and on follow up, 7 of them reported an increase of between 4 and 7 days a week. The remaining patient previously walked on a daily basis and had reestablished his former pattern by the time of follow up.

LEVELS OF	DAILY ACT	IVITY BEFOR n=40	RE MI AND A	AT FOLLOW	UP	
BEFORE MI	4	L4 WEEKS AI 3	TER MI 2	1		
4	0	5	3	0	8	
3	0	6	5	0	11	
2	0	2	14	0	16	
1	0	0	0	5	5	
	0	13	22	5	40	
<pre>KEY: 4 Heavy work, carrying very heavy loads 3 Carrying light loads, often climbing stairs or hills 2 Standing or walking, not lifting or carrying 1 Sitting, not walking much</pre>						

TABLE 5.5

5 patients reported that before MI they were usually sitting during the day and they remained in this category at the time of follow up. However, each reported an increase of 3 days a week of light exercise from their pre MI levels of 0 to 4 days. Overall, reductions in daily activity were appropriate to the circumstances and, in most cases, accompanied by an increase in exercise levels.

Recommendations to restrict specific activities were made by their physicians according to the reports of 15 patients. These included not lifting or moving objects weighing more than 15 or 20 pounds for 11 patients, no vigorous activity for 2 more and both restrictions for the remaining 2 cases. The majority of patients receiving such advice were involved on a daily basis with heavy work routines and/or vigorous exercise prior to MI and were reporting reduced levels of usual daily activity at follow up. Advice to the other 25 patients was reported as continuing their activities as usual unless experiencing chest pain, shortness of breath or dizziness.

Return to work

Prior to MI, 21 patients were employed full time, 6 in management, 5 in private enterprise, 2 in sales, 3 in government and 5 in skilled labour. Returning to work, by follow up, was most common for those in management, private enterprise and sales, and amounted to 85% of the 13 patients involved. In contrast only 38% of the 8 patients in government and skilled labour had returned to work at follow up. Similar patterns of returning to work were described in the literature, most frequently in association with benefits related to sick leave. At follow up, early retirement was the choice of one patient

working in management, and was being considered by 2 others working in skilled labour.

Of the 7 part time employees, 3 reported returning to work by the time of follow up. Each had retired from previous careers in management or sales, and 2 of the 3 were in related positions at the time of MI. The remaining 4 patients had not returned to any part time positions at follow up and reported that they would likely not do so.

At follow up return to work was discussed as a concern by 12 of the 28 who had been employed at the time of MI. This was true whether or not they had already returned to work and focussed on a range of concerns from fear of losing opportunities for advancement to having to accept an early unplanned retirement, and included uncertainty about resuming the same responsibilities at work or negotiating for new arrangements.

Driving

All but 1 of the 35 patients who drove their own car reported they were again driving at follow up. 6 weeks was generally recommended to be the time to resume driving. In fact, 7 had resumed driving within 2 weeks, 11 within 3 to 4 weeks, 10 within 5 to 6 weeks, 3 within 7 to 8 weeks and 3 after the 8th week. The patient who had not resumed driving was in her mid 70's, and was waiting to be retested for renewal of her

driver's licence. She was to be restricted to day time driving for medical reasons related to her cardiac condition.

2. Effects on Dietary Practices

Dietary recommendations were provided to patients and their partners by the nutritionist in hospital and, in some cases, by their family physician. Guidelines included balanced meals with limited consumption of salt and saturated fats, as well as reducing calories and excess consumption of caffeine and alcohol. Individual instructions were included as required.

At follow up, 14 weeks after MI, patients reported that their physician had recommended new dietary practices in 19 cases, and continuing previously recommended practices in 11 other cases. When asked about their main sources of information on changing dietary practices, 29 identified the nutritionist in hospital and, in addition 16 identified the cardiac nurse. Since women were generally preparing the meals, many husbands commented on the fact that their wife was better informed about the details and largely responsible for enabling them to make the changes. With female patients, concern was repeatedly expressed about resuming their role as quickly as possible and taking responsibility for planning their own dietary changes.

Details about reported changes in consumption of salt, saturated fats, calories, caffeine and alcohol follow. In general, it had been recommended to reduce each item from high to low or moderate levels of consumption.

Consumption of Salt

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There were significant reductions reported in the use of table salt as well as in the frequency of consuming salted foods. Reports of the regular use (always or usually) of table salt were reduced from 55% prior to MI to 7% at follow up (Table 5.6). These reductions by 19 individuals were significant on a one tail Sign test, z>4.18, p=.00003.

FREQUENCY OF	USING TABLE SALT BEFORE n=40	MI AND AT FOLLOW UP
LEVEL OF FREQUENCY	BEFORE MI	<u>14 WEEKS AFTER MI</u>
1 and 2	22	3
3 and 4	18	37
	40	40
LEVELS:		
1 = 2 = 3 = 4 =	ALWAYS USUALLY SOMETIMES NEVER	

TABLE 5.6

Patients consumed salty foods less frequently after MI. At follow up 95% limited their consumption to 0 to 1 day per week

whereas prior to MI, only 55% did so (Table 5.7). This difference was significant on a paired one tail t-Test, t=5.05, 40df, p<.0005.



FREQUENCY OF CONSUMING 1 OR MORE SERVINGS OF SALTY FOODS BEFORE MI AND AT FOLLOW UP n=40					
		DAYS/ V	VEEK AFTER 2 to 4	R MI O to 1	
	5 to 7		0	2	2
DAYS/WEEK	2 ± 1		2	1.4	16
BEFORE MI	2 (0 4		<u></u>	14	10
2	0 to 1	0	0	22	22
		0	2	38	40

Consumption of Saturated Fats

The reported use of low fat dairy products and the frequency of consuming fried foods were both significantly changed. The regular use (always and usually) of low fat dairy products was reported to increase from 50% of patients prior to MI to 85% at follow up (Table 5.8). These increases by 14 patients were significant with the one tail Sign test, $z \ge 3.5$, p=.0003.

TABLE 5.8

FREQUENCY OF USING LOW FAT DAIRY PRODUCTS BEFORE MI AND AT FOLLOW UP n=40						
LEVEL OF FREQUENCY	BEFORE MI	14 WEEKS AFTER MI				
1 and 2	20	34				
3 and 4	20	6				
	40	40				
LEVELS:						
1 = ALW 2 = USU 3 = SOM 4 = NEV	AYS ALLY ETIMES ER					

In turn patients consumed fried foods less frequently after MI. At follow up 80% limited their consumption to 0 or 1 day per week whereas prior to MI, only 37% did so (Table 5.9). This difference was significant on a paired one tail t-Test, t=6.2, 40df, p<.0005.

TABLE 5.9

FREQUENCY OF CONSUMING 1 OR MORE SERVINGS OF FRIED FOODS BEFORE MI AND AT FOLLOW UP n=40					
		DAYS/W 5 to 7	NEEK AFTER 2 to 4	R MI O to 1	_
DAVS /WEEV	5 to 7	1	3	2	6
BEFORE MI	2 to 4	0	3	16	19
	0 to 1	0	1	14	15
		1	7	32	40

Caloric Restrictions

Although caloric restrictions were not required of patients who were of inappropriate body weight, there was no difference between their reports about limiting caloric intake and/or consumption of rich or sweet foods, and those of the 18 patients described as overweight. Therefore, all patients and their results are treated as a group.

More patients regularly reduced their caloric intake after MI (37%) than before (20%) (Table 5.10). These changes, reported by 7 patients, were significant on a one tail Sign test, z>2.6, p=.0003.

Patients also reduced by their consumption of rich or sweet foods more frequently after MI. At follow up, 72% limited their

consumption of such foods to 0 or 1 day per week, whereas before MI only 52% reported doing so (Table 5.11). This change was significant on a one tail t-Test, t-3.49, 40 df, p<.005.

FREQUENCY	OF REDUCING CALORIES TO BEFORE MI AND AT FOLLOW $n=40$	REDUCE WEIGHT UP	
LEVEL OF FREQUENCY	BEFORE MI	<u>14 WEEKS AFTER MI</u>	
1 and 2	8	15	
3 and 4	32	25	
	40	40	
LEVELS: 1 = 2 = 3 = 4 =	ALWAYS USUALLY SOMETIMES NEVER		

T.	AB	L	E	5		1	0
_		_	_	-	-	_	_

Further to this, weight loss was reported by only 3 patients; 2 reported losing the desired amounts of weight (20 and 30 pounds respectively) and the other reported losing 15 of the desired amount of 40 pounds. In contrast, 4 patients had not gained any weight and were concerned about losing 10 pounds

after their MI or being underweight to begin with. For the remainder weight was not of overt concern during the interview.

\mathbf{T}	AB	L	Е	-5	•	1	1

FREQUENCY OF CONSUMING 1 OR MORE SERVINGS OF RICH/SWEET FOODS BEFORE MI AND AT FOLLOW UP $n\!=\!40$										
		DAYS/WEEK AFTER MI 5 to 7 2 to 4 0 to 1								
DAYS/WEEK BEFORE MI	5 to 7	1	3	4	8					
	2 to 4	2	4	5	11					
	0 to 1	0	1	20	21					
		3	8	29	40					

Consumption of Caffeine

Considerable change was reported in caffeine consumption through the reduced use of regular coffee. Before MI 30 patients reported consuming an average of 3 cups of regular coffee per day, with a range of 1 to 20 cups, and 2 patients reported consuming 1 to 2 cups of decaffeinated coffee. At the time of follow up, 12 of the regular coffee drinkers reported switching to decaffeinated coffee and reducing their consumption by an average of 40%. The remaining 18 reduced their consumption of regular coffee by an average of 25%.

Consumption of Alcohol

The majority of patients (23) consumed from 1 to 10 drinks per week, while 2 had 11 to 30 drinks and 3 had 31 to 40 drinks. The remaining 12 patients reported not drinking, 3 because of former alcohol-related problems. Changes in consumption were reported by 2 of the 3 patients whose consumption was in the range of 31 to 40 drinks per week, and amounted to reductions of 50% of their former intake.

3. Effects of Smoking

At the time of MI, 14 patients reported being current smokers and at follow up half of these reported having stayed off cigarettes since their MI. The other 7 reported returning to cigarette smoking, 1 immediately and 6 after 5 to 6 weeks. However, 4 of these reported reducing their consumption from 1 or more packs per day to less than 1/2 a pack per day. The further 3 remained at their previous consumption levels, 1 at more than a pack and 2 at 1/2 to 1 pack a day. Quitters and nonquitters were similar in the number of years smoking and the amount smoked.

4. Compliance with Medication Regimes

Medications were reviewed briefly in the follow up interview and 37 of the 40 patients reported being on medication as a consequence of their MI. 24 of the patients identified their medications by name, amount taken and purpose of the drug,

9 of the patients by amount taken and purpose of the drug and the remainder (4) by the amount taken although they were unsure of the purpose or the name. One of the 3 patients that reported not taking medication had a prescription for an antihypertensive drug but felt he didn't need it. The other 2 reported that they didn't need regular medication. 11 patients reported specific occasions on which the cardiac nurse was instrumental in directing them to their physician for medication changes as a result of their signs or symptoms at home.

Most patients reported taking a combination of cardiac medications on a regular basis: 3 patients reported 4 different medications on a daily basis; 16 reported 3; 13 reported 2; and 5 reported only 1 medication. Beta blockers were identified most frequently (26 patients) and calcium inhibitors (16 patients) and long term vasodilators (17 patients) followed. Also included were 14 reports of antiplatelet agents, 5 of digoxin, 4 of antiarrhythmics, 4 of diuretics, 2 of anticoagulants and 1 of cholesterol lowering medication. In addition, 37 patients reported having nitroglycerin on hand, 15 of whom reported never having used it; the other 22 reported using it on some occasion(s) in the first 3 or 4 weeks at home and 12 were continuing its use at the time of follow up. Of the latter 12, 8 were using it rarely, and usually only on exertion, while 4 used it 2 to 3 times a week. All but 5 were aware of maintaining a fresh supply of nitroglycerin. Additional medications were reported by 8 patients for the management of

diabetes or other conditions unrelated to MI. Specific mention was made about taking anti-anxiety medications (3) and sleeping pills (4) for the first time, but inquiries about the use of old prescriptions were not made.

5. Satisfaction with the Program

When asked how the rehabilitation program had specifically affected them each patient made several comments. Although unique in their personal expressions, four common themes ran throughout their comments. Clearly it is difficult to separate the nurse from the program and they are synonymous in the discussion. First, the program was described as timely. Most patients reported reassurance at knowing the nurse would be at their home within 1 or 2 days, and a few who had uncertainty about accepting referral to the program, reported on its usefulness once they were at home. Repeatedly reports were made of "having enough time to get my questions answered" and most often this was during walks with the nurse. Secondly, the program was described as highly informative. Patients reported the nurse to be a "fountain of information" in answering their questions on a broad range of issues related to MI. Frequently they reported uncertainty about calling their doctor in case their concern might be seen as trivial although it may have caused considerable personal concern or confusion at home. They reported the nurse as extremely helpful in clarifying their concerns and/or directing them to their physician. Practicality

was the third theme in patient's comments on the program. "She told me exactly what to do" was a comment frequently used to describe the nurses approach with patients who experienced difficulty in knowing how far and how fast to walk, which hills to climb, which foods to exclude, what tasks to postpone and a host of other questions. Many times they reported surprise at their inability to make what appeared later to have been a simple decision. One patient described the experience as "teaching one large, frightened and usually competent man to again believe he could make wise decisions for himself". Lastly, their reports regularly emphasized an increased sense of confidence from their experience in the program. The nurse was seen to hear and recognize their fears while being frankly honest and "calling a spade a spade". More than once they reported that she gently but firmly directed them to "quit worrying about it and get on with it" when they were procrastinating. One patient described her as "a professional mother who kept me accountable while I was learning what to do. I knew she was concerned but she couldn't do it for me." In conclusion patients were able to describe their perceptions of the program in terms of specific effects on their recovery and reported satisfaction with their experience.

D. Intervening Factors

The goals of the program were ultimately of shared concern to the cardiac nurse and patient if progress was to be made
toward their achievement. During the process of clarifying and achieving the goals, a variety of factors typically intervened, requiring alternative strategies on the part of the nurse and/or patient. Four of the most common factors are described in this section, as they were perceived and reported by patients in their follow up interview. They include, in order, the patient's perceived disposition to MI; their perceived health status during rehabilitation; their beliefs and plans about making recommended changes; and their experience with developing alternative personal strategies.

1. Perceived Predisposition to MI

During the follow up interview the patients were interested, and often eager, to recall the circumstances in which their MI occurred, their experience of hospitalization and some of their insights from the experience. During the discussion they were asked whether or not they had ever thought they might have an MI before it occurred. 22 responded negatively, stating that they never expected it; 8 responded less certainly, qualifying that it seemed unlikely; and 9 reported that it seemed possible but not at the time it happened. Information on 1 patient was missing.

2. Perceived Health Status

There was general discussion about their current condition in the course of the interview. Most patients described a basic

understanding of how a heart attack occurs, whether theirs was "large or small", whether or not their medications were "working" in terms of their intended purpose (for example, reducing blood pressure) and what was expected of them in terms of daily activities, exercise and dietary modifications. Many patients expressed interest in the results of their lipid profiles as an indicator of the effects of dietary change although few knew their results. They were less certain of achieving the desired effects from rest and relaxation. They generally assessed the effects of rest and relaxation in terms of well being or "feeling better" and "getting back to activities" they had been missing. Some described it in terms of "having a different point of view now" and "knowing when to quit."

3. Beliefs and Plans

An attempt to assess the formation of patients intentions on the questionnaire met with limited success. As seen in Table 5.12, the vast majority of patients already **believed** in the importance of acquiring or maintaining behaviours that involved specific **dietary** practices and **exercise** levels, at week 1 after discharge. All **smokers** expressed belief in the importance of cessation 1 week after MI, except for 2 patients, of whom 1 "doubted 4 or 5 cigarettes mattered at her age" and the other expressed dislike for "playing the odds when there was no guarantee anyhow." By the 14th week one patient who continued

to smoke reported a reversal in his initial belief in the need to quit. Approximately half of the patients reported belief in the importance of managing their **time** differently, and this number increased slightly by the 14th week. The only reported decline of belief was in the need to reduce **personal concerns**, identified as important by 70% of the patients at 1 week and only 50% at follow up. Whether the decline was due to resolution of the concerns, a change in perception of their importance or a lack of reporting is unknown.

The number of patients reporting **plans** for change at weeks 1 and 14 were nearly identical with those for beliefs, as seen in Tables 5.12 and 5.13. Similarly most patients reported adequate knowledge and confidence in making the desired changes at both assessment points.

In summary, patients reported a consistency between levels of beliefs, plans, knowledge and confidence. The number of patients reporting positive beliefs and plans increased slightly regarding exercise and recommended dietary practices and decreased regarding smoking cessation. Outcome indicators of time management and resolution of personal concerns were not included. However, at follow up approximately 50% of the patients continued to report concern in the area of managing their time differently as well as their personal concerns.

BELIEF IN THE NEED 1 WEEK AND	FOR SPECIFIC BEHAVIOURAL 14 WEEKS POST INFARCTION n=40	CHANGES
	POST INFARCTION	TIME
	1 WEEK	14 WEEKS
DIETARY PRACTICES	33	36
SMOKING *	12	11
EXERCISE	36	39
TIME MANAGEMENT	18	21
PERSONAL CONCERNS	28	20
* Exception n=14		

TABLE 5.12

PLANS TO MAKE 1 WEEK AND	SPECIFIC BEHAVIOURAL C 14 WEEKS POST INFARCTI n=40	CHANGES CON
	POST INFARCTI	ON TIME
	<u>1 WEEK</u>	14 WEEKS
DIETARY PRACTICES	33	36
SMOKING *	12	10
EXERCISE	33	39
TIME MANAGEMENT	18	20
PERSONAL CONCERNS	28	20
* Exception n=14		

TABLE 5.13

4. Alternate Personal Strategies

Various other new behaviours were described by individuals in response to the advice to "just relax and rest often". As a group, with the exception of 2 patients, there was no essential difference in the number of hours of **sleep** per day either before MI or at the time of follow up. There was an overall average decrease of 2 1/2 hours spent at **work** and related activities while a corresponding increase in **leisure** time was reported with considerable individual variation. Some individuals reported frustration with their attempts to **relax and rest**, since they were unsure if their efforts were effective nor how much time should be involved. However, at follow up the majority indicated they were taking time out from their routines during the day in an effort to relax or nap. A variety of anecdotal reports were offered during the interview. Some reported delegating more work to others and of accepting assistance when it was offered. Other changes were reported as: flying rather than driving on business trips, leaving all work at the office when the work day ends, going out for lunch to avoid being interrupted and arranging and writing music rather than directing musical groups. Two others reported curtailing choir activities that were exciting but left them too tired afterwards. Several reported reminding themselves "Take one day at a time; don't push it, etc." in an effort to change their perspective.

E. Use of Health Hazard Appraisal

Health Hazard Appraisal (HHA) is a method for evaluating a variety of specific risk factors on an individual basis and relating the information to the person's life expectancy. Three different ages are presented in its evaluation: the individual's chronological age, an appraised age based on the present risk factors and an achievable age based on adherence to recommended changes in the given risk factors. Differences between the appraisal age and achievable age can then be reduced by changing health related behaviours.

For the purposes of this study, risk factor data on each patient was entered and evaluated twice: once as it was reported to have been prior to MI and again as it was at follow From the results in Table 5.14 the average appraised age of up. both men and women is seen to be lower at follow up and this is primarily the result of increased exercise levels achieved during the period of rehabilitation. The remaining difference between the average appraised ages at outcome and the lower average achievable ages represents the potential benefit of additional behaviour changes and/or the benefits accrued by maintaining the changes over longer periods of time. It is useful to realize that 2 of the 3 most frequently recommended changes were the same as the goals of the rehabilitation program, that is increased physical activity and smoking cessation. The third recommendation was for weight loss and would be a goal for long term rehabilitation in terms of hypertension, elevated cholesterol levels and general well being.

TABLE 5.14

HEALTH HAZARD APPRAISAL: DIFFERENCES IN THE AVERAGE APPRAISED AGE AND AVERAGE ACHIEVABLE AGE AS A RESULT OF BEHAVIOURAL CHANGES MADE IN THE 14 WEEK PERIOD POST INFARCTION								
AVERAGE AVERAGE APPRAISED AGE ACHIEVABLE AGE								
	ACTUAL AGE	BEFORE <u>MI</u>	14 WEEKS POST MI	BEFORE <u>MI</u>	14 WEEKS POST MI			
MALE	59.9	61.2	58.8	60.3	57.2			
FEMALE	64.6	64.5	63.1	62.7	61.6			

CHAPTER VI: CONCLUSIONS AND RECOMMENDATIONS

In 1985, IHD remained the leading cause of death in Canada, although mortality rates for IHD have been declining since the early 1970's. Debate continues on whether the decline is due to a decrease in the incidence or severity of the disease, to improved survival or to a combination of the two. Meanwhile, direct hospital costs alone were estimated to be \$2 billion in 1985 and are expected to remain that way in the foreseeable future.

Current cardiac rehabilitation practices began approximately 30 years ago. In 1952 early ambulation for patients with MI began with the establishment of Levine's "chair treatment" and since then developments have been dramatic. Non invasive diagnostic techniques have enhanced prognostic capabilities for the post infarction period, including the expanded use of ECG's for early stress testing and ambulatory monitoring, and the use of radionuclide angiography. Rehabilitation has been recognized as part of the acute care services provided in the hospital and is formally organized into 3 separate phases, the last of which focusses on the maintenance acquired exercise levels. Recently the focus of of rehabilitation has expanded to include a range of educational and other psychological interventions that aim at reducing behaviours known to increase the risk of further cardiac events. In Canada, the first cardiac rehabilitation program began at the

Toronto Rehabilitation Centre in 1967. At Lions Gate Hospital the initial Coronary Activation Program began in 1972 and is now accompanied by the Cardiac Early Discharge Service (CEDS), thus providing 2 regular cardiac programs in the Medical Day Centre (MDC).

Evaluation studies of the effects of regular exercise during cardiac rehabilitation have reported improved psychological well being but no significant decrease in the traditional measures of mortality and/or reinfarction rates. There is a reported need to develop new indicators that are more sensitive to the psychological components of rehabilitation including issues to do with the quality of life. In addition to evaluating the effects of exercise, recent studies have increasingly focussed on psychological interventions and outcomes in cardiac rehabilitation. Most notable is the report of significant reductions in the reinfarction rate of patients modifying coronary prone behaviours in the Recurrent Coronary Prevention Project.

The present evaluation describes the effects of CEDS on the length of stay in hospital and on the clinical outcomes and satisfaction of patients in the program. The study is designed to fully describe the background of such a program, to assess the outcomes of first concern to those developing the program and to consider recommendations relevant to future developments in the program.

Results of the evaluation indicate that the goals of the Reduced length of stay reached an program were achieved. average of 8.6 days for uncomplicated MI's and the goal was 8 or 9 days. Complicated MI's reached an average of 11 days length of stay which was considered an appropriate reduction although a specific goal had not been set. Estimates from Medical Records indicated that physicians were referring 92% of the eligible patients. One unexpected result was found in the comparison of length of stay data between patients in CEDS and those living out of the area (and so not referred to CEDS). Complicated and uncomplicated MI's were compared between groups within 3 sequential time periods, and 5 of the 6 comparisons were not significantly different on statistical testing. Therefore. there was no significant difference in length of stay between the CEDS group and a comparison group that did not receive the CEDS program. The reason for this is not known due to insufficient information about patients living out of the area. Since the average length of stay for both groups (CEDS and out of area) was below that for comparative hospital data in the previous year, it is suggested that, perhaps, physicians may have also adopted the practice of early discharge for out of area patients.

Patient outcomes were positive. There were significant increases in the frequency of light exercise (p<.0005), in the regular use of low fat dairy products (p=.0003) and in the practice of restricting calories (p=.003), while significant decreases were reported in the frequency of consuming fried foods (p<.0005), and salted foods (p<.0005) and rich foods (p<.005) and in the regular use of table salt (p=.00003). Caffeine consumption was eliminated by 12 patients and reduced by an average of 25% in 18 others. Consumption of alcohol was reduced by 50% for 2 of the 3 patients reporting an intake of between 31 and 40 drinks per week. In addition 50% of the smokers reported cessation of smoking on follow up. Patients reported a high level of satisfaction with the program, describing the service as well timed, informative, practical and valuable in restoring their self confidence.

Due to the design of the evaluation, the effect of the program cannot be differentiated from other intervening factors, however, and discussion of the results must remain within the descriptive context of a single group design. Further, the results are based on self report and may be biased in favour of meeting the recommendations given during rehabilitation. On several occasions, however, a spouse validated patient responses during the interview and/or patients reported "unfavourable" results which could indicate a relatively high level of validity. Nevertheless, the latter events did not occur consistently throughout the evaluation and are not sufficient evidence for inferring the level of validity of the self reports.

Further opportunity for evaluation will rest with the particular clinical, administrative and research needs of the

Several avenues of investigation are possible with the program. use of alternative designs and the assessment of different variables. Inter-hospital comparisons would be useful in evaluating length of stay data, readmission data and other indicators of hospital effects. This could be facilitated through the use of existing shared data bases. Similarly, clinical effects could be studied through the use of comparison groups from other local hospitals. Further areas of clinical investigation could include the assessment and/or intervention of concerns not addressed in this study. Two examples of concerns arose during this evaluation. One area was raised informally by three male patients during their interviews and it involved a variety of concerns regarding sexual functioning. The other area arose when patients were asked in the interview to informally complete a short questionnaire regarding their predisposition towards coronary prone behaviour. Most patients spontaneously stated that the informal questionnaire was very interesting to complete and in several cases, patients asked additional questions regarding stress related matters. On both issues, patients appeared to be interested and responsive during Many other areas of concern could also be the discussion. considered such as the long term effects regarding the maintenance of new behaviours and integration of services with the community.

In conclusion some recommendations have been developed from the evaluation that could be adopted in the foreseeable future. These are:

- 1. The development of a computerized data base to facilitate ongoing program evaluation.
- 2. The exploration of existing data bases for interhospital comparisons.
- 3. The development of extended services to specifically address the reduction of coronary prone behaviour and other behavioural risk factors after the initial 6 week period of recovery.
- 4. The establishment of a network with other community agencies to facilitate communication and referrals between the different phases of cardiac rehabilitation and to develop strategies for health promotion in the area of cardiovascular disease.

The recommendations fit within the context of the planning and evaluation model presented earlier for the MDC. Implementation of the recommendations will depend on the current needs and available resources of the MDC.

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APPENDIX A: INTRODUCTORY LETTER

.

APPENDIX B: QUESTIONNAIRE AT 1 WEEK POST INFARCTION

QUESTIONNAIRE AT 1 WEEK POST INFARCTION

NAME

PHYSICAL ACTIVITY

Please think of your usual activities in the <u>last year</u> when answering these questions.

1.Which one of the following would best describe your usual daily activities ?

- □ I was usually sitting and did not walk very much
- I stood or walked quite a lot but did not often lift or carry
- I usually lifted or carried light loads and climbed stairs or hills often
- □ I did heavy work or carried very heavy loads

Please comment if this does not describe your activities well

2. How many <u>days a week</u> did you get the following kinds of exercise? (Write 0 if you did not get that kind of exercise.)

- a)30 minutes or more of light exercise such as walking or bowling. _____ days per week
- b) 15 minutes or more of moderate to _____ days per week vigorous exercise such as jogging or bicycling.

Please <u>comment</u> if this does not include your usual kind of exercise.

SMOKING HABITS (IF YOU HAVE NEVER SMOKED SKIP THIS SECTION)

3. For how many years have you smoked cigarettes ? _____ years

4. What is the average number of cigarettes per day that you smoked during that period of time ?

□ 5 or less □ 6 to 10 □ 11 to 20 □ 21 or more 5.Were you smoking regularly at the time of this admission to hospital ?

□Yes □No → When did you quit ? _____ (Go to Q.8)

6.Had you attempted to stop smoking in the last year ? ☐ Yes → How many attempts have you made ? _____ attempts □ No

EATING HABITS

Please think of your usual eating habits in the <u>last few months</u> when answering the next questions.

7.On the <u>average</u> did you eat <u>three</u> regular meals a day ? □Yes □No If you answered <u>no</u>, please <u>describe</u> your usual habits

8. How many <u>days a week</u> would you usually have eaten the following ?

1 or more servings of fried foods _____ days per week
1 or more servings of cookies , _____ days per week
cake or rich dessert

1 or more servings of salty foods _____ days per week such as chips or salted crackers

9. How often would you have done the following ? Please circle the best answer.

	<u>Always</u>	<u>Usually</u>	Sometimes	Never
Added salt to your food at the table ?	1	. 2	3	4
Limited your caloric in- take to reduce weight ?	1	2	3	4
Eaten low fat dairy products such as 2% or skim milk ?	1	2	3	4

10.On the <u>average</u>, how many alcoholic <u>drinks</u> did you have per week?

_____ beer per week

______glasses of wine per week (4 oz. glasses)

_____drinks of hard liquor per week (1 1/2 oz.)

OTHER HABITS

Although the following questions may not seem as directly related to your health , the questions will be about topics that may influence your health. Please think of your habits in the <u>last 6</u> months and answer as accurately as possible.

11. How many hours of your day were usually spent in each of the following activities ?

Working & related activities _____ hours Travelling to/from work _____ " In activities not related to work _____ "

Sleeping

Total = 24 hours

12. How would you describe the amount of <u>sleep</u> that you had ?

☐ More than I needed		🖸 Just	the	right	amount
Somewhat less than	I required	🗍 Much	less	than I	required

13.How often did you feel you had time to yourself when it was needed ?
□ Always □ Usually □ Occasionally □ Rarely

14. How often were your mealtimes relaxing and leisurely ?

□ Always □ Usually □ Occasionally □ Rarely

15.Which of the following, if any, <u>do you believe</u> you should do for the sake of your recovery? Please mark those that you believe are <u>important</u> for <u>yourself</u>.

□ Make dietary changes

□ Stay off cigarettes (Skip if a nonsmoker)

□ Follow an exercise routine _

□ Adjust the way you spend your time

L Reduce personal worries regarding work, finances or family matters 124

- 16.If you <u>marked</u> above that you <u>believe</u> you should make dietary changes, <u>do you know which changes</u> to make ?
 C Yes
 O No
- 17.If you <u>marked</u> above that you <u>believe</u> you should follow an exercise routine, <u>do you know what routine</u> would be best for you ?
 I Yes I NO I Uncertain
- 18. If you have been <u>smoking</u>, <u>and marked</u> above that you <u>believe</u> that you should stay off cigarettes, <u>do you know what steps</u> to take to stay off? (Skip if a nonsmoker) Yes No Uncertain
- 19. If you marked above that you believe you should adjust the way you spend your time, do you know what adjustments to make ?
 I Yes
 No
- 20.If you <u>marked</u> above that <u>you believe</u> you should reduce personal worries about work, finances or family, <u>do you know</u> <u>how you might qo about doing so?</u> Yes No Uncertain

21. Mark the areas in which you plan to make changes.

If you plan to make changes in an area , <u>circle</u> your level of <u>confidence about maintaining the change</u>.

	<u>Plan</u> to Change?		<u>Level</u> Strong	<u>of Co</u> Weak	<u>nfidence</u> <u>Uncertain</u>
	No	Yes	•		
Dietary changes			▶ 1	2	3
Staying off cigarettes		. G	►► 1	2	3
Following an exercise routine	۵	E	⊶> 1	2	3
Adjusting the way you spend your time			Ph 1	2	3
Reducing personal worries re- garding work , finances or family			₩ 1	2	3

Thank you. That completes the questions to be answered. Please return the questionnaire to your nurse in the envelope provided.

APPENDIX C: QUESTIONNAIRE AT 14 WEEKS POST INFARCTION

QUESTIONNAIRE AT 14 WEEKS POST INFARCTION

NAME

PHYSICAL ACTIVITY

Please think of your usual activities in the <u>last two weeks</u> when you are answering these questions.

- 1. Which <u>one</u> of the following would best describe your usual daily activities ?
 - I was usually sitting and did not walk very much
 - I stood or walked quite a lot but did not often lift or carry
 - I usually lifted or carried light loads and climbed stairs or hills often
 - □ I did heavy work or carried very heavy loads

Please <u>comment</u> if this does not describe your activities well

2. How many <u>days a week</u> did you get the following kinds of exercise? (Write 0 if you did not get that kind of exercise.)

- a)30 minutes or more of light exercise such as walking or bowling. ______ days per week
- b) 15 minutes or more of moderate to ______days per week vigorous exercise such as jogging or bicycling.

Please <u>comment</u> if this does not include your usual kind of exercise.

SMOKING HABITS (IF YOU HAVE NEVER SMOKED SKIP THIS SECTION)

3.Have you managed to stay off cigarettes since being in hospital?

□ Yes (Go to question 5)

🗆 No 🏎 How soon did you return to smoking ?_____

4. What is the average number of cigarettes per day that you are now smoking?

□ 5 or less □ 6 to 10 □ 11 to 20 □ 21 or more

EATING HABITS

Please think of your usual eating habits in the <u>last two weeks</u> when answering the next questions.

- 5.On the <u>average</u> did you eat <u>three</u> regular meals a day ? **Tes No**<u>If</u> you answered <u>no</u>, please <u>describe</u> your usual habits
- 6. How many <u>days</u> <u>a week</u> would you usually have eaten the following ?
 - 1 or more servings of fried foods _____ days per week
 1 or more servings of cookies , _____ days per week
 cake or rich dessert
 - 1 or more servings of salty foods _____ days per week such as chips or salted crackers

7. How often would you have done the following ? Please <u>circle</u> the best answer.

	· · · · · · · · · · · · · · · · · · ·	<u>Always</u>	<u>Usually</u>	Sometimes	<u>Never</u>
•••	Added salt to your food at the table ?	1	2	3	4
	Limited your caloric in- take to reduce weight ?	1	2	3	4
	Eaten low fat dairy products such as 2% or skim milk ?	1	2	3	4

8.On the <u>average</u>, how many alcoholic <u>drinks</u> did you have per week?

_____beer per week

_____glasses of wine per week (4 oz. glasses)

_____drinks of hard liquor per week (1 1/2 oz.)

OTHER HABITS

Think of your habits in the <u>last 2 weeks</u> when answering the next few questions . Please be as accurate as possible.

9. How many hours of your day were <u>usually spent</u> in each of the following activities ?

Working & related activities ______ hours Travelling to/from work _____ " In activities not related to work _____ "

Sleeping

Total = 24 hours

10. How would you describe the amount of sleep that you had ?

□ More than	I needed		🗌 Just	the	right	amount
Somewhat	less than	I required	🗌 Much	less	than I	required
		10 - L				

- 11.How often did you feel you had <u>time</u> to yourself when it was needed ?
 Always Usually Occasionally Darely
- 12. How often were your mealtimes relaxing and leisurely ?

] Always	🖸 Usually	🖸 Occasionally	🗌 Rarely
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13. Which of the following <u>do you believe</u> you should start or continue doing for the sake of your recovery ?

Please mark those that you believe are important for yourself.

Make or maintain dietary changes

□ Stay off cigarettes (Skip if a nonsmoker)

□ Follow an exercise routine-

- □ Adjust the way you spend your time
- Reduce personal worries regarding work, finances or family matters

14.<u>If</u> you <u>marked</u> above that <u>you believe</u> you should make or continue with dietary changes , <u>do you know which changes</u> to make or continue ?

🗇 Yes 👘 No 🗇 Uncertain

- 15. If you have been <u>smoking</u>, <u>and marked</u> above that <u>you</u> <u>believe</u> that you should stay off cigarettes, <u>do you know what steps</u> <u>to take to stay off</u>? (Skip if a nonsmoker) I Yes I No I Uncertain

- 18.If you <u>marked</u> above that <u>you believe</u> you should reduce personal worries about work, finances or family, <u>have you</u> <u>done so</u>?

🛛 Yes

🗆 No 🏎

a) If not, do you know how you might go about reducing such worries ?

🗌 Yes 🔄 No 📋 Uncertain

19.Mark the areas in which you plan to make or maintain changes.

If you plan to make or maintain changes in an area , <u>circle</u> your level of confidence about maintaining the change .

	<u>Plar</u> nake, char	<u>to</u> / <u>kee</u> p nge?	, <u>St</u>	Level rong	of Co Weak	nfidence Uncertain
	No	<u>Yes</u>				
Dietary changes			≫	1	2	3
Staying off cigarettes (Skip if nonsmoker)	ם		\$	1	2	3
Following an exercise routine			••	1	2	3
Adjusting the way you spend your time	כ	٦	\$	1	2	3
Reducing personal worries re- garding work , finances or family		. 🗖	••	1	2	3

Thank you. That completes the questions to be answered.

ADDENDIX D: FOLLOW UP INTERVIEW AT 14 WEEKS POST INFARCTION

FOLLOW UP INTERVIEW AT 14 WEEKS POSTINFARCTION

Demographic Information

Occupation Employment Status Residence

Activity Level

Did you have a stress test? If yes, were you directed to the Phase II class? If yes, are you attending?

Do you drive? If yes, how soon after your MI did you return to driving?

Dietary Patterns

Were dietary changes recommended to you? If yes, were they new? Have you had similar recommendations in the past? Where did you get the necessary information to follow recent recommendations?

Medications

What medications are you on? Are you taking them as prescribed? Do you have nitroglycerin? When have you used it?

Is it fresh?

Are there any other changes you would like to mention?

How did the rehabilitation program affect your recovery?

Had you ever expected this MI might have happened?