

WORK STATUS OF PATIENTS AFTER
CORONARY VEIN BYPASS GRAFT SURGERY

by

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A THESIS

Presented to the School of Nursing
and the Graduate Council of the University of Oregon Medical School
in partial fulfillment of
the requirements for the degree of

Master of Science in Nursing Education

June 8, 1973

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ACKNOWLEDGMENTS

The writer wishes to thank the patients who are the subjects of this study for their time and interest in providing much vital information. She also expresses appreciation to the many physicians whose cooperation made the study possible. The advice and encouragement of Doctors Richard Anderson and Albert Starr in particular is gratefully acknowledged. The helpful criticism of Miss Lucile Gregerson and Dr. Julia Brown was invaluable in preparation of the manuscript. Dr. Q. Dean Clarkson was of great assistance in the analysis of statistical data. Dr. May Rawlinson, as thesis advisor, tirelessly contributed her time and knowledge at all stages of work and her efforts are deeply appreciated. Most especially, the writer expresses deep appreciation to her husband for his consideration and support.

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CHAPTER I

INTRODUCTION

Problem

Coronary artery disease is the leading cause of disability and death in men 45 to 64 years of age in the United States as well as in England and Sweden. Coronary atherosclerosis is the basic pathology that causes 90 per cent of cases of angina pectoris and myocardial infarction. (8) The report of the Framingham Study (18) indicated that the prognosis for the angina victim is not optimistic. Twenty-five per cent of the men with angina can expect to experience a myocardial infarction within five years, and about 30 per cent of those over 55 will die within eight years.

A new area of cardiac surgery has developed with the introduction of a direct means of myocardial revascularization, the use of venous bypass grafts from aorta to coronary artery to supply blood to ischemic areas of the heart. (1) The surgical treatment of patients with angina pectoris by means of coronary vein bypass grafts has proved effective in reducing symptoms. However, "since the aim of modern medicine is to restore the disabled

individual to his fullest capacity, not only physically, but vocationally, mentally and socially"(2) it is meaningful to assess any of these factors. The vocational status was selected for analysis in this study. Since nursing is concerned with comprehensive patient care, including prevention, treatment and rehabilitation, it is appropriate that nurses take an active role in assessing the post-operative rehabilitative status of these patients. Therefore, as one important aspect of rehabilitation is the ability of the person to work, the focus of the present study was on the work status of patients following coronary vein bypass graft surgery. Specifically, an analysis of the variables associated with re-employment was attempted here.

Review of Literature

Although some investigators (e. g. Neff and Phelps) question the need to work in our society, the work role is still regarded as the success-failure criterion for most rehabilitation programs in this country. (25, 28) There are several reasons for the closeness of association between rehabilitation and work in the United States. The first is the aim of rehabilitation to help the disabled individual achieve maximal adaptation to the demands of social living. (25) The second is that our society is strongly work oriented and gainful employment is emphasized as a condition for full citizenship. (25, 28)

The third is that the meaning of work has for most persons become conceptualized as an indicator of independence. (28) There is agreement that even if the link between employment and an adequate income could be broken by generous disability benefits, the integrative function of work would have to be performed by a satisfactory substitute.

It is generally accepted that work has more meaning than that of only earning a living. (9, 19, 23, 24) However, its meaning varies among individuals. It may range from how the individual sees his work in relation to his total life to how he feels about a particular job. The meaning of work also differs among broad occupational categories. Individuals in middle-class occupations emphasize the importance of intrinsic qualities of the job itself as well as the satisfaction obtained from doing a job well. Those in working class occupations tend to emphasize the need to have something to do to occupy time. (23) The importance of work in serving extra-financial functions is further indicated in a study by Morse and Weiss (23), in which 80 per cent of a random sample of employed men in the United States indicated that they would continue working even if they inherited enough money to live comfortably without working.

An important aspect of illness and disability is an assumed decline in work capacity which may serve as a socially acceptable excuse not to function at full capacity. However, individuals react

differently to illness and disability. As Nagi (24) has said, "Given similar degrees of limitations in capacities some might consider themselves vocationally disabled and relinquish their work roles and others would not." A number of socio-cultural factors are believed to influence this.

In the 28 studies of cardiac patients reviewed for this study, interesting results are revealed in the consideration of variables presumed to influence the rate of return to work. These variables are 1) demographic (age, sex, marital status, and level of education); 2) work related (type of work, employer's attitude, job tenure, period of unemployment, and motivation to work); 3) financial status; and 4) physical status (severity of cardiac illness, length of time of cardiac condition, number of cardiac illness episodes and factors related to the surgical intervention). A summary of relevant findings in the literature follow under the broad categories of demographic, work related, financial and physical factors.

Demographic Factors

Age: the age of the patient was mentioned by Clark and others as one of the most important determinants in the rate of return to work. (4, 6, 12, 17, 30, 35, 38, 39) The patients in the younger age groups returned to work sooner and in larger numbers than those who were older. There were two reasons given for the relationship

between age and work status. First, age has an effect on employability because there are fewer job opportunities open to the unemployed older worker. (4, 6) Second, cardiac illness may serve as a socially acceptable excuse for early retirement in persons over the age of 55. (6, 29) Two investigators (2, 27) reported that the age of the patient did not seem to influence the length of disability. However, it was still seen as a factor by Blachly and Blachly (2) in determining the number who returned to work. Jezer (16) in a study of cardiacs at the Altro Workshop found that age in contrast to other factors did not appear to be related to success or failure in return to work. Bronstein (3) reported increase in employment for patients aged 55 and over to be almost as great as for the younger aged patients at a work classification unit.

In a randomized retrospective study conducted by the National Health Survey (37) advancing age was associated not only with an increase in heart conditions, but also with a striking increase in disability resulting from these conditions. For example, it was noted that "39.5 per cent of the conditions caused limitation among those under 45 years as compared 60.6 per cent for those 45 to 64 years and 63.6 per cent for those 65 and older."

Sex: Sex was not considered as a variable in most of the studies on return to work of cardiac patients. Some investigators studied only men; others included both sexes but reported their

results in terms of the total group. However, four investigators reported results based on sex. Two reported that there was not a relationship between sex and return to work rates and two reported that there was a relationship. Blachly and Blachly, (2) in a study of 263 persons operated on for various cardiac disorders, reported no gross differences in the rate of return to work for males as compared to females. Jezer (16), in a study of 144 persons with cardiac conditions, reported that unlike functional classification and length of illness, sex did not appear to be related strongly to return to work. Rawlinson (30), in a study of 150 persons following valvular heart surgery, found that women were less successful in terms of rehabilitation than men. Nagi (24) found that among persons with chronic diseases (including circulatory) who applied for disability benefits, women exhibited a greater tendency toward vocational disability than men. Roe (31) tends to lend support for this view. In discussing the general area of psychology of occupations she highlights sex differences in attitudes toward occupations. She stated that many women do not regard their occupations as being of primary importance and therefore may select them more casually. If this be true, women may also feel freer to relinquish their work role.

Marital Status: Jezer (16), in a study of 144 persons with cardiac conditions reported that the marital status of the patient

appeared to be related to successful re-employment. His data showed that the married and widowed were more successful in returning to work than those who were separated or divorced; those who were single showed an intermediate potential for success. However, although it is generally known that the mortality rates for all diseases are higher for the unmarried and divorced than for the married, few studies have explored the relationship between heart disease and family oriented variables. (6)

Level of Education: In studies where education was included as a factor in return to work there was general agreement that the higher the level of education or vocational training the greater the chances for successful re-employment. Jezer (16) reported that there appeared to be a trend for the better educated to be associated with successful rehabilitation. Clark (4), in a study of 277 persons with cardiac conditions found that higher education, particularly special vocational training, facilitated employment. Hay and Turbott (13), in a study of 293 male survivors of myocardial infarction and 44 patients with previous coronary insufficiency under the age of 65, reported that the chance of an early return to work of a person without any particular job qualifications (such as special training) was half that of a person better qualified.

Work-Related Factors

Type of Work: Although investigators interested in this area report a relationship between the type of work the patient normally does and the probability of his return to work, it is difficult to draw any definite conclusions as the researchers report on different aspects of the work situation. Pell and D'Alonzo (27), in a study of 209 persons following myocardial infarction compared white collar (salaried) workers with blue collar workers and found that a somewhat higher proportion of white collar workers was re-employed. The results were substantiated by Weinblatt, Shapiro, Frank & Sager. (38) Other investigators reported on the physical demands of the job. Goldwater, Bronstein, & Dresky (12), in a study of 580 persons with heart disease stated, "Individuals who ceased work had been doing work requiring the greatest amount of physical effort." Sharland (33), in a study of 212 men under 60 years of age following first myocardial infarction, reported that a change of job was more common in those formally engaged in active or heavy work. Comparable results were reported by Weinblatt et al. (38) Ambiguous results were reported by Hay and Turbott (13), in their study on return to work following myocardial infarction or coronary insufficiency. Their findings showed: 1) that fewer sedentary than manual workers had returned to work within one month; 2) the proportion of clerks who were away from work two months after acute illness

was the same as of those involved in heavy labor; and 3) half of the group who did heavy labor had not returned to work two months after acute illness. They found no difference in the percentage of light and "medium" manual workers who returned to work within one month compared to those who returned at two months. The researchers did not include a definition of "medium" manual workers.

Clark (4), in a study of 314 persons with cardiac disease, found that the rate of re-employment was related to the work skill of the patient. Specifically, the higher the degree of work skill, the greater the likelihood of re-employment. Another factor which must be considered in understanding the resumption of work roles is the recreation pattern of the person. Is he sedentary or does active exercise constitute the pattern of his life? Weinblatt et al. (38) have reported that the more physically active the patient was prior to the onset of his myocardial infarction, the better his prognosis for survival and the greater his chances of returning to work. However, this applied more to the white collar worker who engaged in physically active recreational activities than the blue collar who worked at a physically demanding job.

Employer's Attitude: There appears to be marked variation in employers' attitudes toward hiring cardiac patients. (6) Attitudes appear to be more favorable toward hiring white collar workers than blue collar workers. This may be due to the greater physical

demands of blue collar work. Employers are reluctant to hire persons with heart disease as heavy laborers when an exacerbation of the condition might lead to a disability compensation claim.

Job Tenure: Job tenure can be used as a measure of work stability. (24) Patients with stable job histories seem to be more successful in returning to work than those whose job histories revealed employment in transient short-term jobs. (16, 41)

Period of Unemployment: The length of time away from work was reported by Blachly and Blachly (2) and others (3, 4, 16, 17, 27, 30, 38) as being the most crucial factor in determining successful return to work. The longer the patient was unemployed for any reason, the less likely he was to return to work. Weinblatt et al. (38) reported that if the patient had not resumed work by ten months after his myocardial infarction there was little likelihood of a subsequent return. Blachly and Blachly (2) reported that people who were unemployed for a longer time preoperatively took longer postoperatively to resume work. They found that most of those who did not return to work had been unemployed more than six months preoperatively. They stated, "If a person is unemployed for any reason for a period exceeding one year, the chance of re-employment is poor." They suggested that the problem was one of work as a habit and that the rate of rehabilitation could be improved by a preoperative as well as a postoperative rehabilitation program.

Motivation to Work: Three investigators (4, 10, 17) reported that the patient's motivation was an important factor in return to work. The researchers did not state how they measured motivation. The conclusion could have been based on observations that some persons with the physical ability to work were not successful in re-employment, but others with more serious handicaps were successful.

Financial Factors

Jones (17) in a follow-up study of 250 persons with heart disease found that financial rewards played a part in re-employment. For example, skilled workers who could substantially increase family income by working, regained employment in proportionately greater numbers than unskilled workers who could not. Hay and Turbott (13), in a follow-up study of 293 male survivors of myocardial infarction and 44 patients with previous coronary insufficiency under the age of 65, reported that a majority of those who returned to work, returned at their pre-illness income level. However, some did return at a reduced income level. Clark (4) in a study of 314 patients with heart disease, reported that no definite conclusion could be drawn as to the influence of public financial aid or compensation upon re-employment. Price (28) found in a survey of garment workers over a ten year period, that the average

disability period increased in proportion to the increase in the "sick benefits program."

The literature contains numerous references to the effect of Workmen's Compensation Laws on the unavailability of work for known cardiac patients. (14, 15, 29, 34, 36, 40) It is generally agreed that the liberal interpretation of compensation laws and the increasing average age of the workers have aggravated this problem. The rising costs of Workmen's Compensation are causing considerable alarm for the health professions as well as for industry. As was noted earlier, employers may be reluctant to hire persons with cardiac problems because of the threat of compensation claims. This may result in fewer job opportunities for the cardiac patient and thus his ability to find financial security becomes limited.

Physical Factors

Severity of Cardiac Illness: The relationship between return to work and the severity of the illness was not made clear in the reports which were reviewed. It would appear that those persons most severely physically affected may not be able to work. (16) According to Jones (17) the most useful method of assessing ability to work is by the functional classification developed by the New York Heart Association. However, he stated that incapacity to work was the primary reason for unemployment in less than half the cases.

Goldwater et al. (12) reported that some people with a functional classification of three or four were able to perform some type of useful occupational activity. Other investigators (4, 10, 13, 33, 38) indicated that unemployment was largely due to factors other than the severity of the heart disease.

Length of Time of Cardiac Condition: Jezer (16, in a study of 144 persons with cardiac conditions at the Altro Workshops, and Rawlinson (30) in a study of 150 persons after valvular heart surgery, found that the length of time of cardiac illness was an important variable in relation to return to work. People who had been ill longer were less likely to be employed than the more recently afflicted. However, Goldwater et al. (12), in a study of 580 patients with heart disease reported that the majority of patients in their series (75 out of 111) who did not return to work were patients whose heart disease had been known less than five years.

Number of Episodes: The number of episodes of acute myocardial infarction, coronary insufficiency or heart failure experienced by the person appears to be associated with the rate of return to work. (6) For example, the reported rate of return to work for survivors of a first myocardial infarction appears to be good. Master and Jaffe (21) reported that of the 343 patients from whom they obtained work histories, 69.7 per cent, were working full or part-time. Crain and Missal (5), in a follow-up study of 184

male employees of Eastman Kodak Company, reported that 82 per cent were able to resume work. Pell and D'Alonzo (27), in a report of 209 cases indicated that of the 139 survivors, 123 persons (88 per cent) returned to work. Sharland (33) studied 212 persons under 60 years of age who had survived one myocardial infarction and found that 55 per cent were back at work within three months after the episode and 82 per cent within six months. Weinblatt et al. (38), in an 18 month study of the work status following first myocardial infarction, reported that 90 per cent of 189 survivors had returned to work by ten months; and 62 per cent of the 275 known to be working at the time of their myocardial infarctions were employed at 18 months after the episode. There is little information in the literature on the return to work of survivors of multiple infarctions. Stein and Altman (35) reported that few patients ever returned to work after more than one myocardial infarction. They also stated that the number of patients with histories of multiple myocardial infarctions was small and that the death rate was significantly higher.

Surgical Intervention: Estimations of the result of surgery by patients did not closely relate to job status. (2, 20) The few studies available on the rehabilitation of patients following cardiac surgery are difficult to compare because of non-uniformity in the criteria for rehabilitation. Oates, Hickey & Bellinger (26) reported that

74 out of 102 (72 per cent) patients who had a mitral commissurotomy were working. Thirty-seven of those reported working were wage earners and 37 were housewives. Goldberg and Spector (11), in a follow-up study of 116 patients who had undergone cardiac surgery and received rehabilitation services, indicated that 32 of the 84 survivors were employed in the competitive market and 30 as homemakers. Homemakers were considered employed if they could perform at least two household activities unassisted. Blachly and Blachly (2) in a follow-up study of 263 patients who had had cardiac surgery reported that 41 per cent of the patients were not working. Lucia and McGuire (20) conducted a three year follow-up study of 100 patients who had surgery for heart disease. Their results showed that 70 per cent of these patients described themselves as having the same jobs or family responsibilities they had preoperatively. Unfortunately the "same job or family responsibility" was not further defined in this study. Did it mean a return to full time work or a resumption of light tasks that were performed prior to surgery?

In summary, a review of the literature leads to the conclusion that there are many factors influencing the rate of return to work of cardiac patients during the process of recovery and rehabilitation, but exactly what these factors are was not clear. There was general agreement that age and length of period of unemployment were

important. The younger patients returned to work in larger numbers than those who were older. The longer the patient had been unemployed the less likely he was to return to work. Although the investigators agree that the type of work was important in influencing return to work, the evidence was difficult to assess because the researchers reported on different aspects of the work situation. There was some evidence that a person would return to work if by doing so he could improve his financial status. However, the availability of work may be affected by Workmen's Compensation and the employer's attitude toward hiring persons with cardiac problems. The relationship between return to work and the severity of the illness was not clear. Most investigators report that other factors were more important. Although there appears to be agreement on the influence of level of education, job tenure, and motivation to work on return to work, more baseline data are needed before drawing any conclusions. The evidence indicates that the higher the level of education or vocational training the greater the chances for successful re-employment; that persons with stable job histories were more successful in returning to work than those who worked in transient, short-term jobs; and persons with a high motivation to work would return to work even though he may have had more of a physical handicap. More baseline data are also needed on the relationship of variables such as sex, marital status, and

length of time of cardiac illness in order to establish agreement regarding their effect on return to work. There was general agreement that the rate of return to work following one episode of acute cardiac illness was high. However, there was very little information about subsequent episodes. Overall, the results of the few studies available on rehabilitation of patients following cardiac surgery were inconclusive because of the variability in their definition and measurement of recovery.

Definition of Terms

The terms used in this study requiring further definition are:

1. Surgical indication; reason for performing an operation
In this study the indication was incapacitating angina pectoris in one of three categories: 1) chronic angina, 2) congestive heart failure and angina or 3) coronary insufficiency.
2. Coronary insufficiency: The criteria for establishing this diagnosis were as follows: (1) 1) an increase in the frequency, severity and duration of cardiac pain; 2) transitory electrocardiographic evidence of ischemia with subsequent evolution not revealing infarction; and 3) no serum enzyme changes.

Purpose

This study was designed to assess the rehabilitation of

patients with incapacitating atherosclerotic heart disease following treatment by means of a new surgical technique. The study is unique because all subjects had coronary artery disease documented by selective angiography before operation and were treated uniformly by insertion of vein grafts from the aorta to the coronary arteries beyond areas of obstruction. Other surgical techniques of revascularization of the heart were not employed. Thus kind of disease and type of treatment have been excluded as confounding factors and as sources of variance in rehabilitation outcomes. Therefore, the influence of various social, demographic and physical variables on rehabilitation outcomes may be more clearly detected than was possible in prior studies.

For this study, return to work was chosen as the criterion of successful rehabilitation for three reasons. First, it is the most commonly utilized criterion variable for evaluating rehabilitative results. Second, it is an objective measure with face validity. Third, the financial independence and autonomy implied by employment are important to the patient's idea of success. Return to work, as used in this study, was defined as gainful employment (full or part-time), or in the case of housewives, performance of most of the household activities. This study was important for three reasons. The first reason was to provide baseline information on the ability of surgery to return persons who were incapacitated by coronary

artery disease to the work force. The second, was to permit some prediction of the chances for rehabilitation in an individual patient. The third was to uncover groups of patients where special efforts at rehabilitation might be necessary.

CHAPTER II

METHOD

Subjects

The subjects of this study were 301 patients, 258 men and 43 women, who were treated for incapacitating angina pectoris by means of coronary bypass grafting between December 1968 and December 1971. Included in the group were patients with chronic angina pectoris, angina accompanied by congestive heart failure, and coronary insufficiency. All had preoperative documentation of coronary artery disease by means of clinical, electrocardiographic and coronary angiographic studies. The operations were performed by a single group of surgeons who utilized a standard operative technique. (1) Seventy-six patients were treated at a university-teaching hospital, 56 at a federal hospital, and 169 at a community hospital.

This analysis was based on the responses of 278 of the 301 persons (92 per cent) who returned a usable questionnaire.¹

1. A total of 23 persons were deleted from the study for the following reasons: one questionnaire was incomplete, five questionnaires were returned because of no forwarding address, and 17 persons did not return the questionnaire.

The respondents included 238 men and 40 women, whose ages ranged from 34 to 76 years with a mean of 52.8 years. Mean postoperative time was 16.5 months with a range of 5 to 36 months. The subsamples for the three hospitals were first compared with reference to the rate of return to work. They were then pooled and considered as a unit in analyzing the variables affecting return to work.

Sources of Data

The major source of data for this study of the effects of coronary vein bypass graft surgery on work status was a questionnaire (see Appendix B). Items in the questionnaire were devised to tap dimensions and factors shown by previous studies to affect a patient's return to work. These included demographic, occupational, economic, and postoperative assessment variables. The demographic variables that were considered were age, sex, marital status, number of dependent children, current living arrangement, and level of education. The occupational variables referred to periods before and after surgery and included the length of time off work, type of work, physical and emotional demands of the job, job tenure, and reasons for unemployment for those who were unable to work. The economic variables were current level of income, present income compared to that of the preoperative period, and extra source of income as a result of heart disease. The variable included under

postoperative assessment was benefit from surgery as expressed by the patient.

In addition to the data generated by the questionnaire, other information concerning each patient was gathered from his medical data sheet. From the latter, information was obtained concerning disease state, surgical intervention, and postoperative assessment. The variables considered under disease state were previous infarction (number), preoperative angina (type and duration), number of vein grafts utilized for myocardial revascularization, and presence of inoperable vessels at time of operation. The variables included under surgical intervention were surgical indication and length of time since surgery. The variables included under postoperative assessment were physician's estimation of surgical success, postoperative changes in the severity of angina and level of activity.

Procedure

Cooperation was obtained from the institutional officials and from the referring physicians of the private patients (see Appendix A). In the hope of maximizing patient responses, the questionnaires were accompanied by a cover letter signed by a surgeon involved in the patient's care (see Appendix A). Two weeks later a reminder card was sent to the patients who had not returned the questionnaire. One month after the original mailing, another questionnaire and cover

letter (see Appendix A) were sent to the patients who had not responded.

Method of Analysis

On the basis of data obtained from the questionnaire the subjects were placed in one of three groups, 1) subjects who returned to work, 2) subjects who failed to return to work, and 3) subjects who returned to work and later quit. The relations among selected variables were analyzed by three different methods.² First, 24 variables were included in a stepwise discriminant analysis in order to determine the relative importance of these variables in discriminating between the three groups. Second, the 28 variables that applied to all members of the sample were cross tabulated against the dependent variable, return to work. (See tables in Appendix D for cross tabulations.) Chi-square analysis was applied to each cross tabulation to determine whether the independent variables differed significantly from chance expectancy in predicting between Group I and Group II.³ Third, more detailed information regarding work status and income was obtained to allow for further description

2. Dr. Dean Clarkson served as consultant for data analysis. Computer program BMD 07M was used for discriminant analysis. Computer program SPSS for cross tabulation.

3. Subjects in Group III were excluded because the numbers in some categories were too small for chi-square analysis.

of factors which may affect rehabilitative success of the study sample. The results were tabulated. The variable "presence of preoperative angina" was deleted from the analysis since the symptom was present in all subjects.

CHAPTER III

RESULTS

Since the major concern of this study was to examine the determinants of returning to work, the following analysis is based on comparisons among the three categories of patients: Group I, the 137 persons who returned to work, Group II, the 128 persons who failed to return, and Group III, the 13 persons who returned and later quit. As stated above, the differences among the groups were probed and tested for significance by means of three methods.

In Table 1 the relative importance of 24 variables is indicated first by the order in which they entered the stepwise analysis, and second, by the values of the U statistic and the cumulative variance.⁴ The group means and standard deviations of the discriminant variables are presented in Table 2.

The first five variables in the discriminant analysis accounted for 58 per cent of the variance between the groups. Extra source of income, the first variable, accounted for 42 per cent of the

4. Seven subjects were deleted from the stepwise discriminant analysis because of missing data.

Table 1. Order of Appearance of the Discriminant Variables in Stepwise Discriminant Analysis

Step No.	Variable	U* statistic	Variance accounted for
1	Extra source of income	.5761	.4239
2	Sex	.5091	.4909
3	Time off work prior to surgery	.4766	.5234
4	Benefit from operation as expressed by patient	.4398	.5602
5	Current level of income	.4187	.5813
6	Post-operative angina	.4109	.5891
7	Dependent children	.4042	.5958
8	Post-operative activity level	.3978	.6022
9	Number of infarcts -- pre-operative	.3926	.6074
10	Highest level of formal education	.3881	.6119
11	Time since surgery	.3859	.6141
12	Age	.3842	.6158
13	Current living arrangement	.3827	.6173
14	Previous infarction -- pre-operative	.3815	.6185
15	Type of work -- pre-operative	.3804	.6196
16	Physical demands of job -- pre-operative	.3795	.6205
17	Number of vein grafts	.3784	.6216
18	Duration of pre-operative angina	.3774	.6226
19	Surgical indication	.3765	.6235
20	Marital status	.3758	.6242
21	Inoperable vessels	.3756	.6244
22	Emotional demands of job -- pre-operative	.3755	.6245
23	Job tenure	.3755	.6245
24	Estimation of surgical results by the physician	.3754	.6246

* U statistic shows the amount of variance between the groups that is not accounted for by the variables entered.

Table 2. Group Means and Standard Deviations for the 24 Discriminant Variables

Discriminant Variables	Group I		Group II		Group III	
	Mean	S. D.	Mean	S. D.	Mean	S. D.
Extra source of income*	1.89	.32	1.25	.45	1.10	.32
Sex*	1.08	.27	1.23	.42	1.00	0
Time off work prior to surgery	4.16	11.43	19.56	24.57	5.40	8.92
Benefit from operation as expressed by patient*	1.01	.12	1.21	.41	1.10	.32
Current level of income*	2.78	1.30	1.48	.73	1.20	.42
Post-operative angina*	1.43	.54	1.84	.78	1.80	.42
Dependent children	1.23	1.63	.85	1.33	.30	.48
Post-operative activity level*	1.72	.71	2.10	.79	1.60	.84
Number of infarcts (pre-op)	.66	.77	1.02	.97	1.20	.92
Highest level of formal education*	2.58	1.17	2.05	1.06	2.10	.99
Time since surgery (months)	16.47	8.30	16.33	7.24	19.20	8.36
Age	52.14	7.66	53.27	7.80	53.60	10.90
Current living arrangement*	1.96	.21	1.92	.27	2.00	0
Previous infarction (pre-op)*	1.69	.77	1.94	.79	2.00	.67
Type of work (pre-op)*	2.94	1.08	2.41	1.03	2.50	.71
Physical demands of job (pre-op)*	2.20	.73	1.74	.92	1.70	.67
Number of vein grafts	1.41	.49	1.42	.50	1.50	.53
Duration of pre-operative angina*	2.54	1.23	2.72	1.31	2.50	1.08
Surgical indication*	1.47	.98	1.42	.83	1.40	.97
Marital status*	2.06	.38	2.15	.51	2.00	0
Inoperable vessels*	1.21	.41	1.24	.43	1.20	.42
Emotional demands of job (pre-op)*	1.74	.62	1.75	.70	1.70	.67
Job tenure -- Pre-op (years)	12.32	9.57	11.51	9.02	11.80	14.52
Estimation of surgical results by physician*	1.42	.57	1.75	.73	1.60	.70

* Scale scores for these variables are designated in Appendix C.

variance between groups. Fewer persons in Group I reported an extra source of income than those in Groups II or III. Sex, the second variable to enter the analysis, accounted for an additional seven per cent of the variance between the groups. Thus, there were proportionately more women in Group II than in Groups I or III. "Time off work" prior to surgery, the third variable to enter the analysis, explained an additional three per cent of the variance between the groups. Members of Group II were non-working for a longer period of time prior to surgery than were members of Groups I or III. Benefit from the operation, as judged by the patient, was the fourth variable to enter the analysis, and accounted for an additional four per cent of the variance between groups. Proportionately more persons in Group II expressed the opinion that they did not benefit from the operation. Current level of income, the fifth variable to appear in the analysis, accounted for an additional two per cent of the variance between groups. Group I members on the average enjoyed a higher level of income than members of the other groups. The remaining 19 variables accounted for only an additional four per cent of the variance between the groups. As may be observed from Table 2 more persons in Groups I and III reported an increase in postoperative activity level. The longest mean time since surgery occurred in Group III. More persons in Groups II and III reported: a lower level of education, employment

in blue collar occupations prior to surgery, heavy physical demands of their preoperative jobs, a previous infarction (preoperative), and postoperative angina. The physicians also estimated that their surgical results were less successful. Members of Group I had the largest number of dependent children and Group III the fewest. Members of Group I suffered fewer preoperative infarctions than either those in Group II or Group III. Group III persons suffered the most. All three groups were similar with regard to age, current living arrangement, marital status, emotional demands of job (preoperative), job tenure (preoperative), duration of preoperative angina, surgical indication, presence of inoperable vessels, and number of vein grafts.

The correlation matrix of the independent variables from the discriminant analysis is shown in Table 3. These variables can be identified by referring to Table 1. It is important to understand that in the discriminant analysis in the case of two highly correlated variables the one accounting for the most variance enters the analysis earlier. The second variable which provides little new information in discriminating between the groups then drops to a lower step. For example, estimation of surgical results (step 24), the last variable to enter the analysis was correlated with both (step 4) benefit from the operation as expressed by the patient ($r = .37$, $p < .001$) and (step 6) postoperative angina ($r = .65$, $p < .001$).

Table 3. Correlation Matrix of Independent Variables From Discriminant Analysis

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1	1.00																									
2	***	1.00																								
3	.01	.16	1.00																							
4	.09	-.11	.00	1.00																						
5	.05	.09	-.04	***	1.00																					
6	.05	***	.34	-.04	.09	-.05	1.00																			
7	.00	.04	.15	-.10	-.04	.07	1.00																			
8	-.02	-.08	.09	-.07	-.01	.02	.04	1.00																		
9	-.09	.06	-.10	.11	.10	.04	***	-.27	.01	1.00																
10	-.05	-.04	.06	.06	.12	.00	.00	.02	.15	1.00																
11	-.09	*	-.15	-.05	-.29	-.07	**	-.18	-.07	.01	-.10	-.09	1.00													
12	.15	***	.28	-.03	.10	-.01	.05	.09	-.11	.01	-.09	.02	1.00													
13	-.01	-.03	-.03	.05	.18	-.07	.10	.09	-.01	.01	.07	***	.24	1.00												
14	*	-.13	-.13	.02	.05	-.02	-.12	-.04	-.01	.03	.05	-.47	-.12	1.00												
15	***	*	-.13	-.01	***	.44	-.09	-.06	-.01	.00	.13	.07	-.06	.19	1.00											
16	.02	.02	-.03	-.04	.04	-.06	.11	-.01	.09	***	.37	-.09	-.08	-.05	.06	.01	1.00									
17	.06	***	.28	-.03	.08	.12	.09	.00	-.05	.10	-.06	-.02	.09	-.08	.04	.04	1.00									
18	-.07	-.06	***	.33	.01	-.03	.06	-.13	.10	.16	-.07	.12	-.05	-.09	.06	.00	.06	1.00								
19	.01	-.02	.14	.07	.04	.03	***	.17	.19	.05	-.02	-.06	.23	.06	-.11	-.05	-.04	.00	.15	1.00						
20	-.02	-.02	.08	-.01	.03	.03	.11	.01	.15	***	.65	-.10	-.03	.01	-.01	-.02	***	.37	-.11	-.06	-.02	1.00				
21	.04	***	.23	.11	.00	.02	.05	.04	.06	-.03	-.04	.05	.15	.10	-.14	-.11	-.18	.13	-.05	.11	-.13	1.00				
22	***	.15	-.03	***	.43	.11	**	-.03	.01	.00	.01	-.14	.09	-.07	.05	***	.22	-.03	.02	.11	.06	-.10	-.13	1.00		
23	-.04	-.02	.18	-.08	.00	.05	.05	***	.58	-.07	.03	.02	**	.19	-.05	.14	-.05	-.05	-.02	.10	.11	.03	.14	-.09	1.00	
24	.09	**	.18	-.06	**	.18	-.12	.05	-.01	.01	.04	-.02	.00	.17	-.09	-.10	-.09	-.02	.06	.09	.10	-.01	-.05	.15	-.05	1.00

* P < .05; ** P < .01; *** P < .001. Notation of significance appears above correlation.

Inspection of Table 2 revealed that the estimation of surgical results, did indeed discriminate between groups. However, it evidently was not furnishing information that was not already provided by the variables with which it was correlated.

The number of cases correctly classified into groups on the basis of the discriminating power of the variables entered is shown in Table 4. Eighty-seven per cent of Group I, 48 per cent of Group II, and 70 per cent of Group III were accurately classified on the basis of the first five variables. These were most effective in the case of Group I (see Table 4 for numbers correctly classified). The characteristics of this group as portrayed by these variables were the following: no extra source of income, male, average time away from work of four months, subjective report of benefit from surgery, and a higher level of current income.

The next five variables (6-10) improved the accuracy of classification for Group II the most (by 11 per cent). These factors relate to the presence of postoperative angina, less activity since surgery, number of infarcts (more than I, less than III), and less education.

The variables in steps 11-15 improved the accuracy of classification most for Group III (by 10 per cent). The most effective variable appears to be the length of time since surgery, being the longest for Group III. Variables entering after step 15 improved

Table 4. Number of Cases Classified into Groups

Group	Observed N	Work	No Work	Quit	Percent Correctly Classified
<u>Classified on Basis of Variables 1-5</u>					
		<u>Classification Predicted on Basis of First Five Variables</u>			
Work	(135)	118	5	12	87
No work	(126)	15	60	51	48
Quit	(10)	<u>1</u>	<u>2</u>	<u>7</u>	70
Totals		134	67	70	
<u>Classified on Basis of Variables 1-10</u>					
		<u>Classification Predicted on Basis of First Ten Variables</u>			
Work	(135)	118	10	7	87
No work	(126)	16	74	36	59
Quit	(10)	<u>1</u>	<u>2</u>	<u>7</u>	70
Totals		135	86	50	
<u>Classified on Basis of Variables 1-15</u>					
		<u>Classification Predicted on Basis of First Fifteen Variables</u>			
Work	(135)	114	13	8	84
No work	(126)	14	79	33	63
Quit	(10)	<u>1</u>	<u>1</u>	<u>8</u>	80
Totals		129	93	49	
<u>Classified on Basis of Variables 1-20</u>					
		<u>Classification Predicted on Basis of First Twenty Variables</u>			
Work	(135)	115	14	6	85
No work	(126)	14	82	30	65
Quit	(10)	<u>1</u>	<u>1</u>	<u>8</u>	80
Totals		130	97	44	
<u>Classified on Basis of Variables 1-24</u>					
		<u>Classification Predicted on Basis of All Twenty-four Variables</u>			
Work	(135)	115	13	7	85
No work	(126)	14	83	29	66
Quit	(10)	<u>1</u>	<u>1</u>	<u>8</u>	80
Totals		130	97	34	

the classification for Group II by only three per cent.

This information indicates that these variables are effective in classifying these subjects into the correct groups. They are more effective in classifying those patients who returned to work. Group II members were more frequently misclassified as Group III members rather than as Group I members. Therefore, Group II is probably more like Group III on the variables included in the discriminant analysis.

Statistical Significance of the Association of Selected Patient Characteristics With Work Status

In analyzing the data the chi-square statistic was also used to determine whether the selected independent variables could distinguish between Group I and Group II members at better than chance levels. Due to the small number of cases, Group III was not included. For this analysis four additional independent variables were included. Table 5 presents the chi-square values for the association of several personal and social characteristics with return to work. In Table 6 the values relating to the medical-surgical characteristics are presented.

Of the first five discriminant analysis variables listed in Table 1, all proved to predict return to work at significantly better than chance expectation ($p < .001$). As previously mentioned,

Table 5. Significance of the Relationships Between Personal and Social Characteristics and Return to Work

Variable	Chi-square	Degrees of Freedom	Significance (p)
Hospital (community)	30.79	2	.001
Demographic			
Age ^a	4.85	6	n. s.
Sex (male)	11.04	1	.001
Marital status	4.29	3	n. s.
Dependent children ^b	3.43	1	n. s.
Current living arrangement	2.00	1	n. s.
Level of education (college)	18.59	4	.001
Occupational			
Time off work prior to surgery ^c (shorter)	95.36	3	.001
Type of work preoperative (executive or professional)	25.19	3	.001
Preoperative physical demands of job (lighter)	31.82	2	.001
Preoperative emotional demands of job	1.05	2	n. s.
Job tenure ^d	9.09	8	n. s.
Nature of last preoperative work full or part-time (full-time)	5.08	1	.05
Economic			
Current level of income (higher)	90.11	2	.001
Income compared to preoperative (same or more)	102.91	2	.001
Extra source of income (none)	127.43	1	.001

Note: Consult Appendix C for basis of categorization of variables.

For Chi-square it was necessary to recategorize continuous variables

a. age -- five year intervals

b. dependent children -- yes or no

c. time off work prior to surgery -- under 1 month, 1-5 months, 6-12 months, over 12 months

d. job tenure -- 5 year intervals

The category associated with return to work is indicated within the parenthesis.

Table 6. Significance of the Relationships Between Medical-Surgical Characteristics and Return to Work

Variable	Chi-square	Degrees of Freedom	Significance (p)
Disease State			
Previous infarction ^a preoperative (no)	5.68	1	.02
Type of preoperative angina	15.70	4	.01
Duration preoperative angina	3.24	4	n. s.
Number of vein grafts ^b	.13	1	n. s.
Inoperable vessels	.57	1	n. s.
Number of infarcts ^c preoperative (none)	10.31	3	.02
Surgical Intervention			
Surgical indication	5.17	2	n. s.
Time since surgery ^d	13.50	5	n. s.
Postoperative Assessment			
Benefit from operation as expressed by patient (improved)	27.46	1	.001
Estimation of surgical results by physician (excellent)	12.45	2	.001
Postoperative angina (none)	19.49	3	.001
Postoperative activity level (more)	16.13	2	.001

For Chi-square it was necessary to recategorize continuous variables

^a Previous infarction, preoperative -- yes, no (recategorized from scale score in Appendix C)

^b Number of vein grafts -- 1, 2 or more

^c Number of infarcts, preoperative -- 0, 1, 2, 3 or more

^d Time since surgery -- 6 month intervals

The category associated with return to work is indicated within the parenthesis.

these variables constituted the best predictors for Group I.

Four of the next five variables (6-10 in Table 1) that improved the classification the most for Group II were significantly different from chance expectation. The number of infarcts was significant at the .02 level and the others at the .001 level of confidence. As presented in Table 5, the relation of number of dependent children to work status did not exceed chance levels.

It may be noted that variables 11-15 were better in classification for Group III according to the discriminant analysis. This raises the question: Do these same variables of length of time since surgery, age, current living arrangement, previous infarction (preoperative), and type of work (preoperative) operate significantly in terms of Groups I and II? In answer, only type of work ($p < .001$) and preoperative infarction ($p < .02$) were significantly different from chance expectancy.

Of the remaining discriminant variables (16-24) only variables 16 and 24 were associated with work status to an extent significantly different from chance ($p < .001$).

As stated earlier four additional variables were considered only in the chi-square analysis. Two of these variables, the hospital in which the patient received treatment and type of preoperative angina were not appropriate for discriminant analysis. The other two, nature of preoperative work (full or part-time) and current

income compared to preoperative income were extension of variables that had already been included. The results of the analysis were as follows: More of the persons treated in the community hospital and fewer of those treated in the state hospital returned to work. Fewer persons who were working part-time preoperatively returned. Persons who returned to work earned as much or more income as they had preoperatively, those who did not return received less. Fewer persons with nocturnal angina returned to work.

Additional Descriptive Information⁵

From the questionnaire, additional information was obtained relating to those persons who returned to work. The majority (83 per cent) of those who returned to work returned in less than six months following surgery. A little over half (58.4 per cent) returned to full time employment. An additional 20 per cent had first returned to part-time employment, but, had progressed to full time employment by the time of the study. Seventy-five (54.7 per cent) returned to exactly the same job and only 25 (18.3 per cent) indicated they changed jobs. Of the latter the majority appeared to transfer to a job that was physically less demanding. On the other hand emotional demands appeared unchanged.

5. Details relating to points below may be obtained in Tables 8, 9, 10 and in Appendix D.

The persons who did not return to work were asked to state their reasons. Over 50 per cent specified poor health as the reason. Retirement ranked second. A few checked the following reasons: no jobs available, employer's attitude toward cardiac patients, and adequate income.

A final topic of interest, other sources of income, warrants discussion here. Half of our sample (49.6 per cent) reported an extra source of income beyond wages or salaries. This includes 19 of the 137 persons (14 per cent) who were members of Group I, 106 of the 128 persons (83 percent) in Group II, and all the members of Group III. It is clear that more of the persons who did not return to work reported an extra source of income. Table 7 presents the distribution of the other source of income. As can be seen by referring to the first three items on this table, 94 persons (68 per cent) reported disability insurance or compensation. Contributing to a lesser degree were a variety of other sources such as pension, spouse's working (in these instances the husband was the patient), welfare, and assistance from family or relatives.

Table 7. Source of Extra Income Reported by Subjects.

Source	Number	Percentage
Disability insurance or compensation	55	39.9
Disability insurance or compensation and pension	21	15.2
Disability insurance or compensation and spouse working	18	13.0
Pension	13	9.4
Spouse working	13	9.4
Welfare	10	7.2
Assistance from family or relatives	5	3.6
Other (source not specified)	3	2.2

N=138; percentage rounded to nearest tenth.

CHAPTER IV

DISCUSSION

Since coronary bypass graft surgery is performed mainly to relieve the symptoms of angina pectoris any assessment of treatment is of necessity largely subjective in nature. This makes quantification of results or comparison with other forms of therapy extremely difficult. For this reason objective criteria by which surgery can be evaluated are being actively sought so that possible risks and benefits can be better understood. The work status of previously disabled persons after operation is clearly one such objective measure of benefit. However, the results described herein strongly suggest that work status is influenced not only by the course of heart disease but also by various life circumstances which are not directly associated with the disease state. The interplay of factors from both of these areas, as will be seen, often appears to determine the result.

Demographic Factors

Two demographic variables, sex and level of education, were important in relation to work status. Men were more successful in

returning to work than women. This finding is in agreement with Rawlinson's observation that women were less successful in terms of rehabilitation following valvular heart surgery than men. Nagi (24) also reported that among patients with a variety of chronic diseases women exhibited a greater tendency toward vocational disability than men. In the present study only 11 of the 40 women returned to work: 9 resumed full household work and 2 resumed outside jobs. Before surgery, 24 women reported employment outside the home. Perhaps, as Roe (31) has suggested, women may not regard their outside occupations as being of primary importance and may feel freer to relinquish these work roles. However, 29 women also indicated a diminished capacity for housework. This could be due simply to the inability of these women to meet the high energy costs of many household tasks because of residual cardiac disease. However, it is also possible that illness was used as a socially acceptable excuse for failing to perform disagreeable heavy housework. This latter interpretation is supported by Wilder's (39) observation that middle-aged men tend to use cardiac illness as a socially acceptable excuse for early retirement. Pertinent to this was the comment received from one woman, age 57, who did not resume full housework: "My only job for 36 years has been that of housewife and mother. However, I now do just very light work which suits me just fine."

Level of education was a factor in return to work in this study. Only 29 per cent of the persons with a grade school education returned to work, whereas 69 per cent of those with a college education returned. These results agree with those reported in the literature by Clark (4), Hay & Turbott (13), and Jezer (16). This may be a reflection of the relationship between education, type of work and physical demands of the job. The better educated have jobs that are physically less demanding; therefore they are able to return to work.

Croog et al. (6) reported a study by L. G. Reeder on differences in management attitudes and policies, depending on type of employment. He concluded that special adjustments were made by employers for employees in higher status occupations to allow them to return to work, whereas policies toward blue collar workers were less favorable.

Age, one of the most important influences on the rate of return to work for many persons with cardiac disability reported in the literature (5, 6, 12, 17, 30, 38, 39) was not significant in this study. Only three of the studies reviewed (3, 16, 27) found that age was not an important factor.

The absence of significant differences in the return to work rates among the various age groups in this study may be a reflection of the generally older groups represented. The mean age of study

patients was 52.8 years and 242 patients (87 per cent) were older than 45 years. Jones (17) found that satisfactory re-employment was achieved for 73 per cent of the patients under 45 years of age, but for only 41 per cent over this age. Rawlinson (30) reported in a study of postoperative valvular heart patients that the mean age of patients who returned to work (6-8 hours per day, work) was 44.5 years. The National Health Survey report (37) showed a striking increase in disability resulting from heart conditions for persons over 45. Chi-square analysis of return to work rates among study patients above and below age 45 indicated no statistically significant difference; however, the proportion of younger patients returning to work was slightly higher. Thus, although age did not appear as an important factor in distinguishing between return to work rates of age groups it may have been of considerable importance in the determination of the overall rate of return to work in the sample studied.

Work Related Factors

Several work related variables appeared to bear heavily on subsequent work status. Prominent among these was the duration of time away from work before surgery. In general, the shorter the preoperative unemployment period for an individual, the more likely he was to return to work after operation. For example, 92

per cent of the 59 persons away from work less than one month prior to surgery returned, while only 10 per cent of the 61 persons away more than 12 months did so. These observations support the conclusions of many other studies (2, 3, 4, 16, 17, 27, 30, 38) that length of time away from work is an important determinant of return to work rates. Blachly & Blachly (2) have suggested that work is a habit which once lost, is difficult to regain despite successful treatment of underlying disability. The important implication here is that early effective treatment of persons who are vocationally disabled by coronary artery disease appears necessary for a maximum return to employment.

When subjects in this study were classified according to the type of work performed a striking contrast in work status was found. While 76 per cent of 70 managerial and professional persons returned to work only 40 per cent of 150 blue collar workers were re-employed. Pell & D'Alonzo (27) and Weinblatt et al. (38) have also made the observation that white collar workers are more successful in regaining employment than are blue collar workers. In part, this may be related to the physical effort required of these individuals. When asked to classify their work in terms of physical demands only 27 per cent of 90 persons who did heavy labor were re-employed while 70 per cent of 67 persons whose jobs included only light physical effort returned to work. This marked discrepancy

in return to work rates clearly indicates that special efforts may be required for successful vocational rehabilitation among those whose livelihood depends upon physical labor.

The reluctance of employers to rehire the cardiac patient does not appear to be an important cause of unemployment in this study. Only 2 of 128 persons who did not return to work indicated that their employer's attitude was the reason for not working and only five patients indicated that no jobs were available for them.

Financial Factors

The economic variables, extra source of income, current income, and income comparison to preoperative were significantly related to work status. Extra source of income appeared to be the most important variable in discriminating between working and unemployed groups, accounting for 42 per cent of the variance between these groups. Among 138 persons who reported an extra source of income, disability insurance or compensation in most instances, only 19 achieved re-employment. Most of those unemployed were off work before surgery for prolonged periods and cited ill health as the major cause of failure to regain employment. Many studies have expressed concern in recent years over the cost of Workman's Compensation for heart disease (14, 15, 29, 34, 36, 40). The above observations suggest that, for patients with coronary artery

disease, early and effective treatment would seem to be the best way to reduce this cost.

Patients who returned to work were found to have a considerable economic advantage over those who did not. Average income for those employed was more than double that for the unemployed. A comparison of preoperative and postoperative income indicated the same or greater income for patients employed and less income for those unemployed. Thus, although disability payments may have afforded a measure of security to the unemployed, this extra income did not reach pre-disability income levels, presumably leaving the factor of economic motivation for re-employment intact.

Physical Factors

In investigations of patients with heart disease (4, 10, 13, 33, 38) work status often appears to be most strongly related to factors other than the severity of heart disease. In part, this may be caused by difficulties inherent in any attempt to quantify accurately the severity of cardiac disease. Selzer and Cohn (32), for example, have called attention to the many errors inherent in most commonly employed functional classifications of heart disease. These classifications rely mainly upon a physician's assessment of the patient's history unsupported by objective data. The resulting classification is subject to both bias and guesswork. A similar difficulty in

assessing disease severity is present in this study. Dysfunction of the study patients was caused primarily by pain, angina pectoris. Although all patients were considered disabled by their angina at the time of operation, obviously the intensity of discomfort could vary widely. However, four objective factors concerned with the severity of the disease were available from the patients' medical histories for analysis. A previous myocardial infarction had been experienced by 162 patients and significantly fewer of these ($p < .02$) returned to work than those who had not had an infarct. The number of previous infarcts was found to be inversely related to re-employment ($p < .02$). Re-employment was achieved by 59 per cent of 116 persons without prior infarction, 48 per cent of 108 persons with one infarction, 33 per cent of 39 persons with two infarctions and only 27 per cent of 15 persons who had three or more infarctions. These results agree with those reported by Croog et al. (6) in a survey relating the number of episodes of acute cardiac illness to rate of return to work. Similarly, Stein & Altman (35) reported that few persons ever return to work after more than one myocardial infarction.

Since surgical treatment might be expected to modify the influence of preoperative severity of disease on postoperative work status it is pertinent to inquire why the effect of previous myocardial infarction, as one indicator of severity, remains so prominent.

Myocardial infarction results in irreversible changes within the heart, such as the replacement of muscle by scar tissue. Thus, although surgical revascularization might relieve ischemia of heart muscle, it could have little or no effect on previous infarct damage and its functional expression.

Another indicator of disease severity, the presence of angina at rest or at night, was present preoperatively in 125 patients of whom 65 (52 per cent) failed to return to work. Significantly fewer of these patients than expected ($p < .05$) returned than of those 148 patients whose angina could only be provoked by exertion. In the exertional angina group 63 (41 per cent) did not return to work. Thus, although surgery permitted many patients with ischemic rest pain to return to work it was apparently not as effective in this group as in that with exertional angina alone.

The duration of angina before operation was not related to work status. This observation might seem paradoxical in light of the strong relationship between duration of preoperative unemployment and work status. However, it is known that angina may exist for prolonged periods without causing an individual to cease working. Once an individual reaches the point where disability prevents work his chances of re-employment, even following successful treatment, increasingly diminish with time. Thus, job loss may be regarded as a crucial point in the clinical course of the disease which

clearly signals the need for effective treatment.

Two intraoperative objective variables pertaining to the severity of disease were analyzed. The number of grafts required to revascularize the heart, in part reflects the distribution and severity of significant obstructive lesions in the coronary arteries as does the number of arteries found unsuitable for grafting because of the presence of severe diffuse atherosclerosis. Neither variable was related to subsequent work status.

The four postoperative assessment variables were based on a subjective appraisal by either the patient or his physician of the clinical result of surgery. All of these variables showed a striking relationship to work status.

Among the 278 study patients 247 (89 per cent) considered themselves benefitted by the operation. The benefit expressed by the patient ranged from complete loss of pain to an improvement in the condition with residual pain. The extent of this benefit was directly related to work status. Asymptomatic patients were more likely to return to work than patients who reported diminished but residual angina. There were only 31 persons who indicated lack of benefit from operation; however, this variable emerged as important in relation to work status because 28 of these persons did not return to work.

Persons who reported an increase in their activity level

following surgery were more likely to return to work than those who reported a decrease. However, failure to return to work did not usually imply a decrease in physical activity. Eighty-three (65 per cent) of the 128 persons who did not return to work reported an activity level equal to or greater than that during the preoperative period.

Persons estimated by their physicians to have excellent clinical results tended to return to work while those considered unimproved did not. The physician's estimate of clinical results and the patient's post operative anginal state were highly correlated ($r = .65$). This association is attributable to the apparent tendency of physicians to base their estimate of results upon relief of symptoms. Nearly two-thirds of the patients considered to have an excellent clinical result and completely relieved of angina returned to work.

Implications of the Study

What do these variables predict regarding work status? First, the discriminant analysis was most successful in predicting the types of individuals who returned to work and least successful in predicting those who did not return. One cannot look at return to work and no return as being polar opposites or as being located on a single continuum. Second, 38 per cent of the variance between

practice, and thus the results achieved can properly be regarded as the minimum obtainable. During the past several years the indications for the type of surgery represented here have broadened considerably and application of the technique has become widespread.

The information contained herein should provide a useful data base for physicians who bear the responsibility for choosing and recommending therapy and for health officials concerned with the economic impact of coronary artery disease and its treatment upon individuals and society as a whole. The nurse, and especially the nurse specialist in cardio-vascular disease, should find that knowledge of factors shown to influence postoperative work status is helpful in counseling and directing patients toward full rehabilitation.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this study was to obtain information about the work status of patients following coronary vein bypass graft surgery and to determine the association of selected demographic, socioeconomic, and physical variables with return to work. Of the 301 persons contacted to participate in this study, 278 (92 per cent) returned usable questionnaires. Of the respondents, 137 (49 per cent) returned to work, 128 (46 per cent) did not return to work, and 13 (five per cent) returned to work and later quit.

A stepwise discriminant analysis, used to determine the relative importance of the variables in discriminating between the groups, revealed that 87 per cent of the subjects who returned to work could be correctly classified into this group on the basis of the first five variables to appear in the discriminant analysis. These variables were: extra source of income, sex, time off work prior to surgery, benefit from the operation as expressed by the patient, and current level of income. Thus an individual was likely to return to work if he was a man who had been unemployed

only a short time before operation, did not receive disability income but received greater than average current income, and felt he had benefited from the operation. Since 38 per cent of the variance between groups was not accounted for by the study variables entered in the discriminant analysis other unmeasured factors would appear also to influence work status.

Chi-square analysis indicated the significant relationship of many independent variables to work status. Women were less successful in returning to work than men. In part this may be attributed to a sex difference on emphasis and need for work outside the home. However, since the ability to do full housework was used as a criterion of re-employment for the homemaker, a considerable amount of heavy physical labor was necessarily involved. Thus the physical demands of the job may have introduced a bias which produced an apparent sex difference.

The educational level of the subjects had a marked influence on work status with college graduates returning to work at double the frequency of grade or high school graduates. However, the better educated also tended to hold jobs that were not physically demanding. From the standpoint of society as a whole, the surgical treatment employed appeared most successful in returning to the work force those individuals who were the most highly trained and financially rewarded.

The length of time off work before operation was a critical factor in regaining employment. Few individuals unemployed for more than six months returned to work. Since the opportunity for re-employment begins to ebb the moment the angina patient loses his job, early surgical treatment thereafter would appear to provide the best chance for a return to the work force. Persons with blue collar jobs who perform heavy physical labor for a livelihood were found to have reduced chances for re-employment after surgery. This group appears to be in need of special rehabilitative efforts and should certainly benefit from the attention of health workers actively engaged in vocational and rehabilitation therapy.

Persons who failed to return to work usually had secured an extra source of income, disability insurance or compensation in most instances. Long periods of preoperative unemployment were the rule in this group and ill health was the most frequent reason given for failure to return to work. Early and effective treatment of symptoms would appear to be a desirable way to keep these individuals off the disability rolls.

Severity of coronary artery disease in terms of previous myocardial infarction was found to have an adverse effect on work status. Similarly, patients with the most severe preoperative angina pectoris tended to be slightly less successful in achieving re-employment. However, when the operation eliminated angina

completely most people returned to work. Conversely, when symptoms remained unimproved a return to work was rare.

It may be concluded from these data that successful coronary bypass graft surgery eliminated or reduced the subjective symptoms of ischemic heart disease in 90 per cent of study patients and permitted nearly 50 per cent to return to work. Among those who were unemployed, ten per cent were not symptomatically improved by the operation. In the remaining 40 per cent of patients both cardiac and non-cardiac factors tended to be responsible for failure to return to work.

Recommendations for Further Study

1. The present study was considered successful in correctly classifying these patients into groups. However, a cross-validation study to determine the effectiveness of these variables in predicting work status on another patient sample is indicated.
2. A study using a random sample of working and non-working subjects should be conducted to probe for psychological adjustment factors. These influences on work status were not specifically investigated in the present study.
3. A continuing follow-up study of work status in these subjects would provide valuable information of the durability of treatment results.

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APPENDICES

Appendix A

Correspondence

STARR-WOOD P. C., PROFESSIONAL CORPORATION
Cardiovascular and Pulmonary Surgery
3181 S. W. Sam Jackson Park Road
Portland, Oregon 97201
228-9181 Ext. 1177

April 19, 1972

During the past several years direct revascularization of the heart by means of aortocoronary bypass grafts has been successfully applied to an increasing number of patients with angina pectoris. Many of these patients, previously incapacitated, have been able to return to gainful employment after operation. Although the operation is performed primarily to relieve physical suffering, the economic implications of rehabilitation are of great importance to the patient as well as to the profession and to the public.

We are, therefore, proposing to conduct a special study on occupational status, and factors that may influence it among patients who have undergone vein bypass graft surgery. JoAnne Anderson will do this study. It will also be used to fulfill the thesis requirement for her Master of Nursing Degree. Copies of the thesis will be placed in the library at the University of Oregon Medical School.

We would like to contact your patients listed on the attached sheet by questionnaire about May 8, 1972. Please advise us if you do not wish your patients included in this study. The results should be completed and available by Fall, 1972.

Your support of this study will be greatly appreciated.

Sincerely,

Albert Starr, M. D.

AS:kh
Enclosure

Mrs. JoAnne Anderson is a regularly enrolled graduate student at the University of Oregon School of Nursing. Any assistance you can offer her will be greatly appreciated.

May Rawlinson, Ph. D.
Thesis Advisor

UNIVERSITY OF OREGON MEDICAL SCHOOL
Division of Cardiopulmonary Surgery
3181 S. W. Sam Jackson Park Road
Portland, Oregon 97201

Division of Cardiopulmonary Surgery

May 8, 1972

As part of a continuing effort to evaluate the long-term results of vein graft surgery, we are sending you a questionnaire. We realize that many of the questions we are asking are very personal. However, your answers are of importance to us in assessing what this type of surgery means for you, the patient. Your reply, as always, will be held in the strictest of confidence.

It would be a great help to us if you would take time today to complete the enclosed questionnaire and return it to us as soon as possible. This questionnaire is self-addressed and requires no postage. You need only seal it when completed and drop it in the mail.

Feel free to add any comments you may have. If you have any questions, please do not hesitate to contact my office.

Your assistance is greatly appreciated. I shall await your early reply.

Sincerely,

Albert Starr, M. D.
Professor of Surgery
Chief, Cardiopulmonary Surgery

AS:kh
Enclosure

UNIVERSITY OF OREGON MEDICAL SCHOOL
3181 S. W. Sam Jackson Park Road
Portland, Oregon 97201

Division of Cardiopulmonary Surgery

June 15, 1973

We have not received your Postoperative Heart Surgery Questionnaire which was mailed to you five weeks ago. In the event that it was lost we are enclosing another one. Your answers to these questions are of importance to us in evaluating the results of the surgery.

It would be of great help to us if you would take the time today to complete the enclosed questionnaire and return it to us as soon as possible.

You need only seal the questionnaire when complete and drop it in the mail. It requires no postage.

Your reply, as always, will be held in the strictest of confidence. If you have any questions, please do not hesitate to contact my office.

Thank you for your assistance.

Sincerely,

Albert Starr, M. D.

AS:ja
Enclosure

Appendix B
Questionnaire

QUESTIONNAIRE

Name _____

Date of Surgery _____ / _____ / _____

Age _____ Sex: _____ Male _____ Female _____

The following questions are of real scientific importance to us in gaining a better understanding of coronary heart disease and its surgical management. Please answer each question to the best of your ability. Your answers will be held in the strictest confidence.

1. Marital Status (check one)
 1. _____ single
 2. _____ married
 3. _____ separated or divorced
 4. _____ widowed
2. Number of dependent children

3. Your current living arrangement (check one)
 1. _____ alone
 2. _____ with someone
4. a. Give date of last employment before surgery.
Month _____ Year _____
- b. Was this work (check one)
 1. _____ part-time
 2. _____ full time
5. a. What type of work did you do? (check one that most nearly applies)
 1. _____ housewife
 2. _____ construction, farming, mechanical, craftsman, etc.
 3. _____ clerical or sales
 4. _____ business manager, executive or professional
 5. _____ retired
 6. _____ other (explain)

- b. Would you classify the physical demands of this work as (check one)
 1. _____ heavy
 2. _____ moderate
 3. _____ light
 4. _____ other (explain)

- c. Would you classify the emotional demands of this work as (check one)
 1. _____ very stressful
 2. _____ moderately stressful
 3. _____ not stressful
 4. _____ other (explain)

6. How long did you have this job?
_____ years
7. a. Give date you returned to work after surgery.
Month _____ Year _____
- b. Was this work (check one)
 1. _____ part-time
 2. _____ full time
8. Is your present work (check one)
 1. _____ part-time
 2. _____ full time
 3. _____ housewife doing most of my housework
 4. _____ housewife doing only light housework
 5. _____ other (explain)

9. Compare your present work with your work prior to surgery. (check one)
 1. _____ exactly the same job
 2. _____ same job -- modified
 3. _____ changed -- similar job
 4. _____ changed -- lighter job
 5. _____ not working yet
 6. _____ retired since surgery
 7. _____ retired before surgery
 8. _____ disabled
 9. _____ other (explain)

10. a. If you have changed jobs what type of work do you do now? (check one that most nearly applies)
1. _____ housewife
 2. _____ construction, farming, mechanical, craftsman, etc.
 3. _____ clerical or sales
 4. _____ business manager, executive or professional
 5. _____ retired
 6. _____ other (explain)

- b. Would you classify the physical demands of this work as (check one)
1. _____ heavy
 2. _____ moderate
 3. _____ light
 4. _____ other (explain)

- c. Would you classify the emotional demands of this work as (check one)
1. _____ very stressful
 2. _____ moderately stressful
 3. _____ not stressful
 4. _____ other (explain)

11. If you are unable to work at the present time check reason. (check one)
1. _____ poor health
 2. _____ no jobs available
 3. _____ employer's attitude toward cardiac patients
 4. _____ retired
 5. _____ adequate income
 6. _____ other (explain)

12. What is your current level of income? (check one)
1. _____ under \$5,000
 2. _____ \$5,000 to \$9,999
 3. _____ \$10,000 to \$14,999
 4. _____ \$15,000 to \$19,999
 5. _____ over \$20,000
13. How does your current income compare with what it was before the operation? (check one)
1. _____ same
 2. _____ more
 3. _____ less
14. a. Are you now dependent on some extra source of income not previously available as a result of your heart condition? (check one)
1. _____ yes
 2. _____ no
- b. If yes, check source
1. _____ disability or compensation
 2. _____ pension
 3. _____ spouse working
 4. _____ assistance from family or relatives
 5. _____ welfare
 6. _____ other (explain)

15. What was your highest level of formal education? (check one)
1. _____ grade school
 2. _____ high school
 3. _____ trade or vocational school
 4. _____ college (BA or BS)
 5. _____ graduate or professional school
16. Do you feel you benefited from the operation? (check one)
1. _____ yes
 2. _____ no
17. Briefly explain your answer to question 16.
18. Other comments:

Appendix C

Variables

Appendix C

Variables

Hospital (1 = community, 2 = state, 3 = federal)

Demographic:

Age (in years, present)

Sex*(1 = male, 2 = female)

Marital status*(1 = single, 2 = married, 3 = separated or divorced,
4 = widowed)

Number of dependent children

Current living arrangement*(1 = alone, 2 = with someone)

Level of education*(1 = grade school, 2 = high school, 3 = trade
or vocational school, 4 = college, 5 = graduate or professional
school)

Occupational

Time off work prior to surgery (months)

Type of work -- preoperative*(1 = housewife, 2 = construction,
farming, mechanical, & craftsman, 3 = clerical or sales,
4 = business manager, executive or professional, 5 =
retired)

Preoperative physical demands of job*(1 = heavy, 2 = moderate,
3 = light)

Preoperative emotional demands of job*(1 = very stressful,
2 = moderately stressful, 3 = not stressful)

Job tenure (years)

Nature of last preoperative work (1 = part-time, 2 = full time)

Economic

Current level of income*(1 = under \$5, 000, 2 = \$5, 000 to \$9, 999, 3 = \$10, 000 to \$14, 999, 4 = \$15, 000 to \$19, 999, 5 = over \$20, 000)

Income compared to preoperative (1 = same, 2 = more, 3 = less)

Extra source of income*(1 = yes, 2 = no)

Disease State

Previous infarction -- preoperative*(1 = no, 2 = yes, documented, recent, 3 = yes, documented, remote -- over two years)

Type of preoperative angina (1 = none, 2 = exertional, 3 = rest, 4 = nocturnal, 5 = crescendo, 6 = coronary insufficiency)

Duration preoperative angina*(1 = less than 1 year, 2 = 1-3 years, 3 = 3-5 years, 4 = 5-8 years, 5 = 8-15 years.

Number of vein grafts

Inoperable vessels*(1 = no, 2 = yes)

Number of infarcts -- preoperative

Surgical Intervention

Surgical indication*(1 = chronic angina, 2 = angina and heart failure, 3 = coronary insufficiency)

Time since surgery (months)

Postoperative Assessment

Benefit from operation as expressed by the patient*(1 = yes, 2 = no)

Estimation of surgical results by the physician*(1 = excellent, no symptoms, 2 = fair, improved with symptoms, 3 = equivocal, not improved, 4 = poor, worse)

Postoperative angina *(1 = no chest pain, 2 = less chest pain, 3 = some chest pain, 4 = more chest pain)

Postoperative activity level*(1 = greater than preoperative, 2 = same as preoperative, 3 = less than preoperative)

Descriptive

Time off work after surgery (months)

Return to work -- amount (1 = part-time, 2 = full time, 3 = housewife doing most of housework, 4 = housewife doing only light housework)

Comparison to preoperative work (1 = exactly the same job, 2 = same job -- modified, 3 = changed -- similar job, 4 = changed -- lighter job, 5 = not working yet, 6 = retired since surgery, 7 = retired before surgery, 8 = disabled.

Changed jobs -- type of postoperative work (1 = housewife, 2 = construction, farming, mechanical, & craftsman, 3 = clerical or sales, 4 = business manager, executive or professional, 5 = retired.

Changed jobs -- physical demands of work postoperative (1 = heavy, 2 = moderate, 3 = light)

Changed jobs -- emotional demands of work postoperative (1 = very stressful, 2 = moderately stressful, 3 = not stressful)

Nature of postoperative work (1 = part-time, 2 = full time)

Unable to work (1 = poor health, 2 = no jobs available, 3 = employer's attitude toward cardiac patients, 4 = retired, 5 = adequate income)

Other source of income (1 = disability insurance or compensation, 2 = pension, 3 = spouse working, 4 = assistance from family or relatives, 5 = welfare, 6 = other, 7 = not applicable, 8 = 1 & 2, 9 = 1 & 3)

Appendix D
Cross Tabulation Tables
of Chi-square Variables

Table 8. Work Status in Relation to Age in Years

	34-40	41-45	46-50	51-55	56-60	61-65	66-76
work	7	19	35	36	17	18	5
no work	6	15	29	31	24	14	9
quit	<u>1</u>	<u>0</u>	<u>1</u>	<u>5</u>	<u>4</u>	<u>2</u>	<u>0</u>
totals	14	34	65	72	45	34	14

Table 9. Work Status in Relation to Sex

	Male	Female
work	126	11
no work	99	29
quit	<u>13</u>	<u>0</u>
totals	238	40

Table 10. Work Status in Relation to Marital Status

	Single	Married	Separated or Divorced	Widowed	No Response
work	3	125	5	3	1
no work	2	109	11	6	0
quit	<u>0</u>	<u>13</u>	<u>0</u>	<u>0</u>	<u>0</u>
totals	5	247	16	9	1

Table 11. Work Status in Relation to Number of Dependent Children

	0	1	2	3 or More
work	68	19	23	27
no work	78	19	16	15
quit	<u>9</u>	<u>4</u>	<u>0</u>	<u>0</u>
totals	155	42	39	42

Table 12. Work Status in Relation to Current Living Arrangement

	Alone	With Someone	No Response
work	6	129	2
no work	11	115	2
quit	<u>0</u>	<u>13</u>	<u>0</u>
totals	17	257	4

Table 13. Work Status in Relation to Preoperative Time Away From Work

	Under 1 Month	1-5 Months	6-12 Months	Over 12 Months	No Response
work	54	59	6	6	12
no work	4	34	20	54	16
quit	<u>1</u>	<u>7</u>	<u>2</u>	<u>1</u>	<u>2</u>
totals	59	100	28	61	30

Table 14. Work Status in Relation to Type of Preoperative Work

	Housewife	Blue Collar	Clerical or Sales	Executive or Professional	Retired	No Response
work	5	60	17	53	0	2
no work	11	81	16	16	3	0
quit	<u>0</u>	<u>0</u>	<u>3</u>	<u>1</u>	<u>0</u>	<u>0</u>
totals	16	150	36	70	3	2

Table 15. Work Status in Relation to Preoperative Physical Demands of Job

	Heavy	Moderate	Light	No Response
work	24	63	47	3
no work	62	43	19	4
quit	<u>4</u>	<u>8</u>	<u>1</u>	<u>0</u>
totals	90	114	67	7

Table 16. Work Status in Relation to Preoperative Emotional Demands of Job

	Very Stressful	Moderately Stressful	Not Stressful	No Response
work	47	76	11	3
no work	50	61	11	6
quit	<u>4</u>	<u>8</u>	<u>1</u>	<u>0</u>
totals	101	145	23	9

Table 17. Work Status in Relation to Job Tenure in Years

	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	No Response
work	36	24	20	12	13	14	7	1	2	8
no work	34	23	15	15	16	4	2	2	2	15
quit	<u>4</u>	<u>3</u>	<u>4</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>0</u>
totals	74	50	39	27	29	18	9	4	5	23

Table 18. Work Status in Relation to Current Level of Income

	Under \$5,000	\$5,000 to \$9,999	\$10,000 to \$14,999	\$15,000 to \$19,999	Over \$20,000	No Response
work	20	46	32	10	24	5
no work	80	24	5	0	2	17
quit	<u>9</u>	<u>3</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>
totals	109	73	38	10	26	22

Table 19. Work Status in Relation to Present Income Compared to Preoperative Income

	Same	More	Less	No Response
work	88	19	26	4
no work	16	2	96	14
quit	<u>0</u>	<u>0</u>	<u>13</u>	<u>0</u>
totals	104	21	135	18

Table 20. Work Status in Relation to Extra Source of Income

	yes	no
work	19	118
no work	106	22
quit	<u>13</u>	<u>0</u>
totals	138	140

Table 21. Work Status in Relation to Highest Level of Education

	Grade School	High School	Trade School	College	Graduate School	No Response
work	20	65	15	26	10	1
no work	44	53	13	10	5	3
quit	<u>4</u>	<u>6</u>	<u>2</u>	<u>1</u>	<u>0</u>	<u>0</u>
totals	68	124	30	37	15	4

Table 22. Work Status in Relation to Benefit from Surgery as Expressed by Patients

	Yes	No
work	135	2
no work	100	28
quit	<u>12</u>	<u>1</u>
totals	247	31

Table 23. Work Status in Relation to Time Since Surgery in Months

	Under 5 Months	6-11 Months	12-17 Months	18-23 Months	24-29 Months	30-25 Months	36-37 Months
work	4	43	37	24	15	12	2
no work	5	34	29	37	18	4	1
quit	<u>0</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>1</u>	<u>1</u>	<u>0</u>
totals	9	80	69	64	36	17	3

Table 24. Work Status in Relation to Hospital

	Federal	State	Community
work	20	17	100
no work	33	44	51
quit	<u>2</u>	<u>1</u>	<u>10</u>
totals	55	62	161

Table 25. Work Status in Relation to Preoperative Previous Infarction

	no	yes
work	68	69
no work	45	83
quit	<u>3</u>	<u>10</u>
totals	116	162

Table 26. Work Status in Relation to Number of Infarcts

	0	1	2	3 or More
work	68	52	13	4
no work	45	49	24	10
quit	<u>3</u>	<u>7</u>	<u>2</u>	<u>1</u>
totals	116	108	39	15

Table 27. Work Status in Relation to Type of Preoperative Angina

	Exertional	Rest	Nocturnal	Crescendo	Coronary Insufficiency
work	85	10	11	10	21
no work	63	12	32	9	12
quit	<u>5</u>	<u>1</u>	<u>4</u>	<u>0</u>	<u>3</u>
totals	153	23	47	19	36

Table 28. Work Status in Relation to Duration of Preoperative Angina

	Less Than 1 Year	1-3 Years	3-5 Years	5-8 Years	8-15 Years
work	25	61	17	21	13
no work	18	56	18	16	20
quit	<u>2</u>	<u>6</u>	<u>3</u>	<u>0</u>	<u>2</u>
totals	45	123	38	37	35

Table 29. Work Status in Relation to Surgical Indication

	Chronic Angina	Angina and Heart Failure	Coronary Insufficiency
work	104	16	17
no work	96	24	9
quit	<u>9</u>	<u>2</u>	<u>1</u>
totals	209	42	27

Table 30. Work Status in Relation to Number of Vein Grafts

	One	Two
work	82	55
no work	74	54
quit	<u>7</u>	<u>6</u>
totals	163	115

Table 31. Work Status in Relation to Presence of Inoperative Vessels

	No	Yes
work	109	28
no work	97	31
quit	<u>11</u>	<u>2</u>
totals	217	61

Table 32. Work Status in Relation to Postoperative Angina Compared to Preoperative

	No Chest Pain	Less Pain	Same Pain	More Pain
work	80	53	4	0
no work	48	60	15	5
quit	<u>3</u>	<u>9</u>	<u>1</u>	<u>0</u>
totals	131	122	20	5

Table 33. Work Status in Relation to Postoperative Activity Level Compared to Preoperative

	Greater	Same	Less
work	58	59	20
no work	35	48	45
quit	<u>7</u>	<u>2</u>	<u>4</u>
totals	100	109	69

Table 34. Work Status in Relation to Estimation of Surgical Results by Physician

	Excellent	Fair, Improved	Same	Poor, Worse
work	84	48	5	0
no work	54	56	16	2
quit	<u>6</u>	<u>5</u>	<u>2</u>	<u>0</u>
totals	144	109	23	2

Table 35. Work Status in Relation to Nature of Preoperative Work (Full or Part-time)

	Part-time	Full-time	No Response
work	10	122	5
no work	20	99	9
quit	<u>2</u>	<u>11</u>	<u>0</u>
totals	32	232	14

Appendix E

Additional Descriptive Tables

Table 36. Additional Factors Related to Return to Work for 137 Patients in Group I

Variable	Number	Percentage
Time off work after surgery		
Under 1 month	0	0
1 to 5 months	114	83.2
6 to 11 months	9	6.6
12 to 17 months	1	.7
No response	13	9.5
First return to work		
Full-time	80	58.4
Part-time	47	34.3
No response	10	7.3
Employment at time of study		
Full-time	109	79.6
Part-time	19	13.9
Housewives doing most of household activities	9	6.6
Comparison to pre-operative work		
Exactly the same job	75	54.7
Same job, modified	36	26.3
Changed to a similar job	7	5.1
Changed to a lighter job	15	10.9
Changed to part-time work	2	1.5
Changed to housewife	1	.7
No response	1	.7

N = 137 subjects who returned to work.
 Percentage rounded to nearest tenth.

Table 37. Changes in Type of Work as Indicated by 25 Subjects

Variable	Number
Type of Work	
Similar job (coded same category)	
Construction, farming, mechanical or craftsmen	2
Clerical or sales	2
Business manager, executive or professional	3
Lighter job	
Same category	
Construction, farming, mechanical, or craftsman	5
Clerical or sales	1
Construction, farming, mechanical, or craftsman to clerical or sales	4
Construction, farming, mechanical, or craftsman to other (did not indicate what other was)	2
Construction, farming, mechanical, or craftsman to business manager	1
Business manager to clerical or sales	2
Full-time to part-time work	2
Clerical or sales to housewife	1
Physical demands of job	
More physically demanding to less physically demanding	
Heavy to moderate	6
Heavy to light	5
Moderate to light	3
Physical demands remained the same	
Moderate	7
Light	3
Less physically demanding to more physically demanding	
Light to heavy	1
Emotional demands of job	
More stressful to less stressful	
Moderately stressful to not stressful	7
Very stressful to moderately stressful	3
Very stressful to not stressful	1
Emotional demands remained the same	
Very stressful	3
Moderately stressful	9
Less stressful to more stressful	
Not stressful to moderately stressful	1
Moderately stressful to very stressful	1

Table 38. Reasons Given For Not Working by 128 Patients in Group II

Reason	Number	Percentage
Poor health	71	55.5
Retired	24	18.7
No response	13	10.2
Other (reason not specified)	11	8.6
No jobs available	5	3.9
Employer's attitude toward cardiac patients	2	1.6
Adequate income	2	1.6

N = 128; percentage rounded to nearest tenth.

AN ABSTRACT OF THE THESIS OF

JOANNE ANDERSON

For the MASTER OF SCIENCE IN NURSING EDUCATION

Date of receiving this degree: June 8, 1973

Title: WORK STATUS OF PATIENTS AFTER CORONARY VEIN
BYPASS GRAFT SURGERY

Approved: _____

Thesis Advisor

This study is a description and analysis of work status in patients previously disabled by ischemic heart disease who were treated by coronary bypass graft surgery. The topic has not been previously investigated and the work was initiated because of great interest in the results of this new treatment by workers in the field of heart disease. Two-hundred seventy eight patients, 238 men and 40 women operated upon between December 1968 and December 1971 form the study group. Mean age of the patients was 52.8 years (range 34-76) and mean time after operation was 16.5 months (range 5-36). Following operation 137 patients (49 per cent) returned to work, 128 patients (46 per cent) did not return to work, and 13 patients (five per cent) returned to work and later quit. A stepwise discriminant analysis was applied to 24 independent variables drawn from demographic, socio-economic, and clinical data. This indicated

that 87 per cent of the group which returned to work could be classified correctly by means of the first five variables to enter the analysis. The factors were absence of an extra source of income, male sex, short duration of preoperative unemployment, acknowledged benefit from operation, and above average income.

Further analysis of the data suggested that in the management of patients with ischemic heart disease factors are present during each stage of treatment which might favorably influence subsequent work status. Preoperatively, a decision for surgical treatment before the occurrence of multiple myocardial infarctions or prolonged unemployment would appear to reduce the likelihood of postoperative unemployment. Intraoperatively, the most complete relief of myocardial ischemia should be sought since complete relief of ischemic symptoms seems vital to achieving a high rate of re-employment. During the postoperative period, special rehabilitation efforts appear to be indicated for individuals who must perform strenuous work.