Title

The impact of coping, anxiety and social support on information, medical and rehabilitation outcomes in patients undergoing coronary angioplasty

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Author

Shaw, Richard E.

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The Impact of Coping, Anxiety and Social Support on
Information, Medical and Rehabilitation Outcomes
in Patients Undergoing Coronary Angioplasty

by

Richard Eugene Shaw

DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

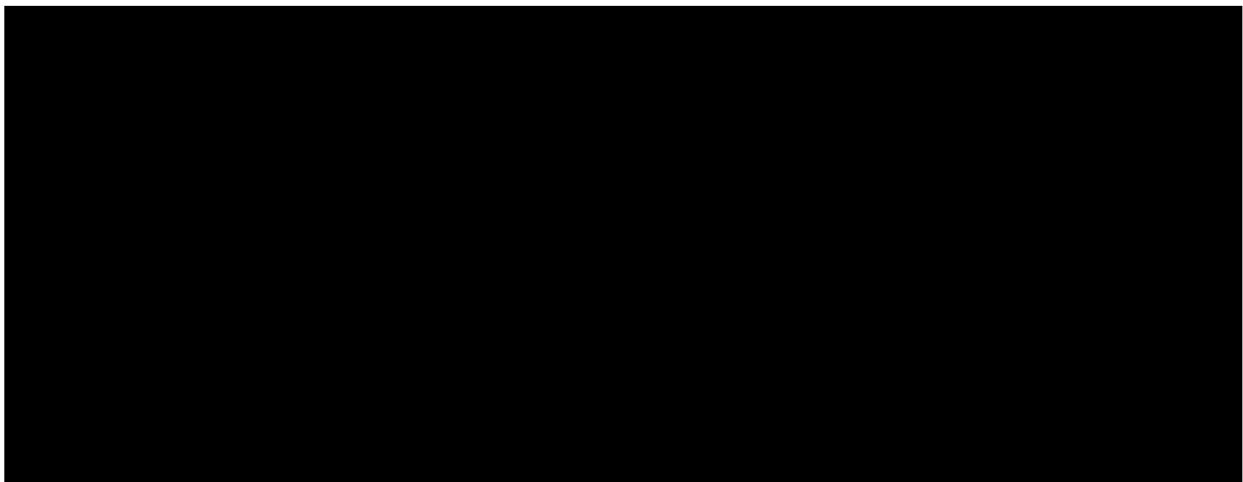# DOCTOR OF PHILOSOPHY

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ABSTRACT

The Impact of Coping, Anxiety and Social Support on
Information, Medical and Rehabilitation Outcomes
in Patients Undergoing Coronary Angioplasty

Richard E. Shaw

A promising recent development in the treatment of coronary
artery disease has been Percutaneous Transluminal Coronary
Angioplasty (P.T.C.A.), a procedure in which a narrowed cor-
onary artery is widened using a balloon-tipped catheter. No
research exists which explores the interplay between psycho-
logical, informational and medical factors and their impact
on outcomes in patients undergoing P.T.C.A. This study ex-
amined the effect of psychosocial factors on the amount of
information gained by P.T.C.A. patients, and identified fac-
tors which predict psychosocial and medical outcomes during
the six months following P.T.C.A.

Ninety-seven first-time P.T.C.A. patients completed a
pretest of their knowledge about the procedure and coronary
risk factors. Patients were then given a structured educa-
tional program. Coping was assessed using an interview
technique (an episodic measure of avoidance-vigilance) and a
questionnaire (a dispositional measure of repression-sensi-
tization). Patients also completed the Multidimensional

Health Locus of Control scale, the Norbeck Social Support Questionnaire, and the Spielberger State-Trait Anxiety Inventory. Prior to discharge, P.T.C.A. knowledge and state anxiety using the Adjective Generation Technique were measured. Six months after the procedure, social functioning, anxiety, mood disturbance (POMS), and work status were assessed. Referring physicians provided information about the occurrence of restenosis (re-narrowing) of the artery and medical complications during the six months.

Results revealed: 1) vigilant patients had more knowledge than avoiders on admission only if their dispositional coping mode involved no preference for repression or sensitization; 2) repressors gained less knowledge during hospitalization, controlling for IQ and medical condition; 3) patients who were more internal and believed more in powerful others were less anxious after the procedure; 4) patients with smaller social support networks were more anxious six months after P.T.C.A.; 5) repressors with coping style-information level mismatch and no history of heart attack experienced more complications during the 6 months; 6) sensitizers with coping style-information mismatch had higher rates of restenosis if the procedural outcome was only moderately successful; 7) patients who were more anxious during hospitalization had poorer social functioning and more mood disturbance at 6 months. These results were discussed and interventions for P.T.C.A. patients were outlined.

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INTRODUCTION

Significance

The commitment of health care professionals to educate medical patients has grown substantially during recent years. Nearly every health care institution in the United States supports some type of formal or informal structure to provide information to patients undergoing medical procedures and treatments. As consumers of health care services, patients are demanding to know more about what is happening to them when they receive health care services. In addition, the emergence of "informed consent" issues has placed increasing legal pressure on health care providers to disclose more verbal and written information about the risks and benefits of medical procedures and treatments (Loftus & Fries, 1979). Unfortunately, this growth in the importance of patient education has not been matched by a concomitant increase in our understanding of the factors which may influence educational efforts, or in clarifying the effects of information on short and long term health outcomes. We still do not know how much information is necessary for beneficial outcomes to occur. It is not clear under what circumstances different types of information (e.g., specific versus general information) are helpful or harmful. And

perhaps most important, we do not have a clear understanding of the psychological characteristics of individual patients which may enhance or hinder what they learn, and how the interaction of psychological factors and information may influence short and long term health outcomes.

Increased knowledge in these areas is important both theoretically and practically. The health care system provides an excellent setting in which to examine theories of learning and personality. Patients are in a situation in which there are usually many unknowns and an abundance of stressors. This environment challenges the patient to assimilate a great deal of information in a short time under these stressful conditions. These extreme circumstances offer an opportunity to explore how behavioral theories may help us understand the experience of the individual. From a practical point of view, clarification of the factors which may influence and be influenced by information could provide health care professionals with a basis to "tailor" education to the needs and characteristics of the individual patient. Such an approach could improve the quality and efficiency of care provided to the patient by health care professionals.

Research Goal

This study had two major aims: to explore the impact of psychosocial factors on information processing in a group of patients undergoing a medical procedure called Percutaneous

Transluminal Coronary Angioplasty (P.T.C.A.), and to determine if psychosocial, informational and/or medical factors influence health and functional outcomes during the six months after the procedure.

The Medical Procedure of Interest

P.T.C.A. is a treatment procedure used in cardiology to widen a coronary artery that has been narrowed by a build-up of plaque along the walls of the vessel. During P.T.C.A. a catheter with a balloon on the end is inserted into the brachial artery of the arm or the femoral artery of the leg and is guided into the coronary arteries, which supply blood to the heart muscle. The ballon-tipped catheter is then positioned within the narrowed part of the artery and is inflated, pushing the plaque into the intima (the soft inner wall of the artery), fracturing the atherosclerotic plaque and dilating the intima. The diameter of the coronary artery is widened and blood flow to the heart is increased. Refer to Figure 1 for a graphic illustration of this process.

P.T.C.A. provides an ideal situation in which to study the interrelationships among psychosocial, informational, functional and medical outcome variables. Since it is a relatively new procedure, much of the general public is unfamiliar with how the procedure is performed and the risks that may be involved. There is information available, but patients desiring to know more than a basic description of
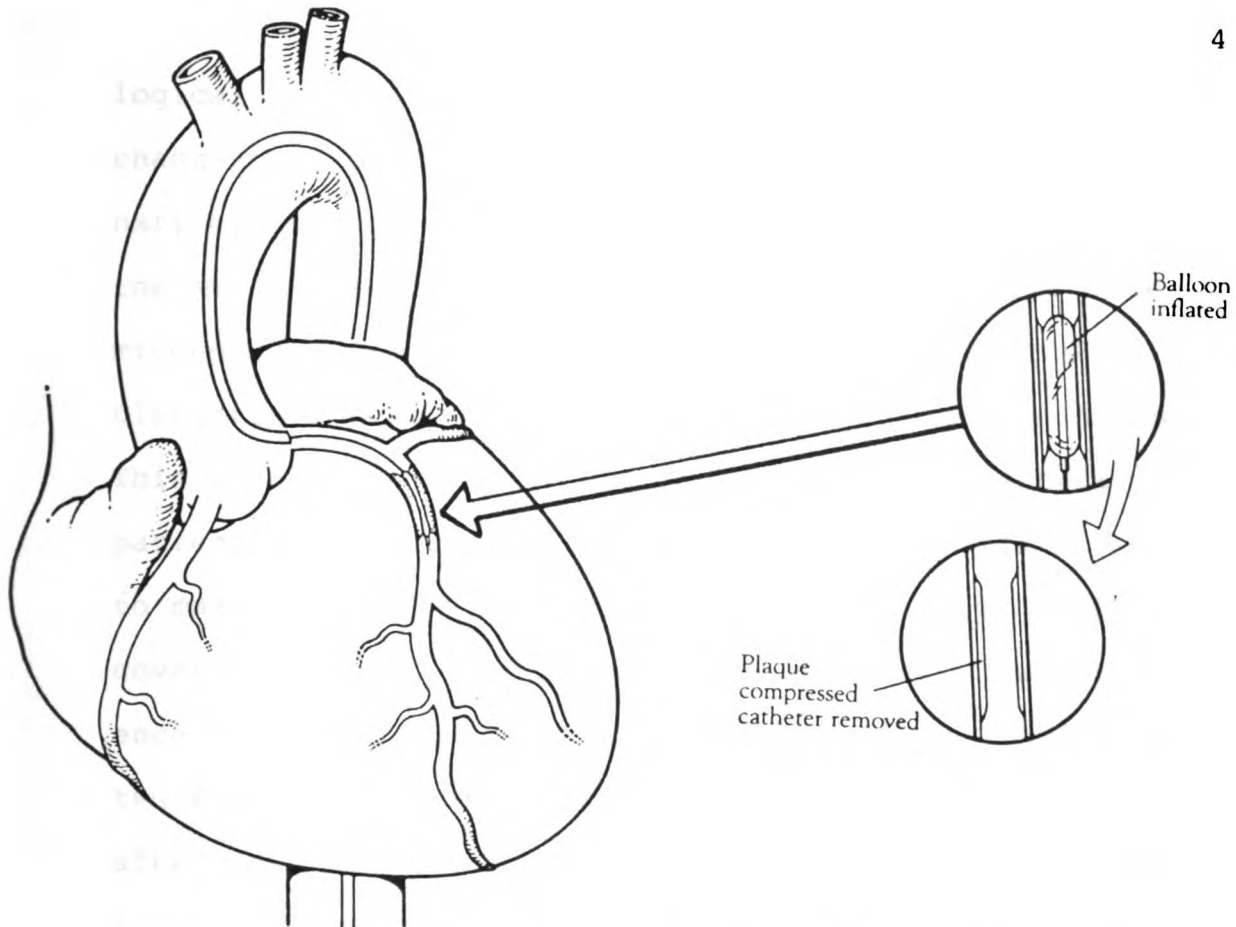
Figure 1:   Illustration of the P.T.C.A. Procedure

the procedure usually have to go to some lengths to obtain additional information. In addition, during their hospital-ization, P.T.C.A. patients are given cardiac rehabilitation information similar to that given to coronary bypass pa-tients. Whether blood flow to the heart is increased as a result of P.T.C.A. or coronary bypass surgery, patients un-dergoing these treatments have not been cured of the under-lying coronary disease process. This means that life style changes which are suggested for patients who have had heart attacks or have undergone coronary bypass surgery are impor-tant for angioplasty patients as well. However, the psycho-

logical status and motivation to make critical lifestyle changes may be different in P.T.C.A patients. Because coronary bypass surgery involves significant physical trauma, in the early stages of recovery these patients are often reminded of the severity of their condition by the pain and discomfort which results from their surgical incisions. This condition can be a factor in motivating coronary bypass patients to follow medical recommendations more closely and to make lifestyle changes during this early part of the recovery process. P.T.C.A patients, however, usually experience much less discomfort from the procedure itself, and often return to normal functioning levels in a matter of days after the procedure. Health professionals who work with these patients have commented that often P.T.C.A. patients react as if they are completely cured of their coronary disease, or that their condition may not have been that critical initially because the intervention was not as traumatic as bypass surgery. These circumstances may heighten the importance of providing these patients with accurate and realistic education about coronary artery disease risk factors.

One of the major concerns of cardiologists is the rate of restenosis (re-narrowing) of the artery after P.T.C.A. (Holmes, 1983). Recent findings from the National Heart Lung and Blood Institute (NHLBI) Registry for P.T.C.A. patients, which includes data on over 3,000 patients, indicate that between 20% and 34% of the patients who undergo coro-

nary angioplasty have restenosis during the first 6 months after the procedure (Detre & Kelsy, 1983; Kent et al., 1982; Jutzy, Berte, Alderman, Ratts & Simpson, 1982). Some factors that have been examined which may predict restenosis include male sex, age greater than 60, recent discovery of coronary artery disease, variant angina, and Class III or IV angina (Dangoise et al., 1982; Detre & Kelsy, 1983). Since a majority of the research to date has been done using patients with single vessel disease, it is not clear whether the same factors that correlate with restenosis in single vessel disease will also correlate with restenosis in multivessel disease patients. There is also some controversy as to whether patients with multivessel disease have rates of restenosis similar to or higher than patients with single vessel disease (Guiteras Val et al., 1982; Hartzler, Rutherford, McConahay, & McCallister, 1982). No studies to date have examined any psychosocial or informational factors in patients undergoing P.T.C.A., and none of these variables have been correlated with occurrence of restenosis or other functional and health outcomes. All of these factors make P.T.C.A. an ideal procedure for studying psychosocial, information and health outcome variables.

Review of the Relevant Literature

A large body of research has focused on the factors which may influence how much individuals learn, what characteristics of the person and situation affect what is learned, and the impact of learning on a variety of behavioral and physiological outcomes. Although much of this research has not involved medical patients, an effort has been made in this review of the literature to focus as much as possible on studies which have have examined the impact of learning on outcomes in cardiac patients. The first section of this review presents some of the general theories which have been proposed to explain how information helps individuals cope with stress. This is followed by a presentation of studies which have explored the effect of educational efforts on cardiac patients. The remainder of the literature review focuses on research that examines psychosocial constructs which may be potentially important in understanding variations in how much information patients gain about P.T.C.A., and the effect of that information on health outcomes. These constructs include avoidance-vigilance, anxiety, repressive style, health locus of control, social support and social networks.

The Effect of Information on Coping with Stress

Much of our daily experience suggests that knowing more about what is going to happen to us leads to greater efficacy in dealing with stressful situations. Early studies in this area, most notably the work of Janis (1958), suggested that gaining information about a situation assists the individual in knowing what to expect, and this awareness leads to more effective ways of coping with the threat of the event. In his studies of 22 surgical patients and 149 male college students who had major and minor surgeries, Janis (1958) developed the concept of the "work of worry" to explain how fear was related to information, and how these factors relate to medical outcome. His results suggested that patients who experienced moderate amounts of reflective fear prior to the stressful event would search selectively and efficiently for information, which would reduce their anxiety and provide them with effective coping strategies (Janis & Leventhal, 1965, 1968). Patients who experienced low amounts of reflective fear would not seek information, and those with excessive fear would engage in unselective, inefficient exposure to information. These latter two groups would have poorer psychological and medical outcomes because of their ineffective preparation. Janis' surgical studies upheld this "curvilinear" relationship, demonstrating that patients in the middle group had better outcomes than those in the extreme groups. Unfortunately, these

studies have never been replicated, possibly because they both have serious methodological and sampling flaws, such as pre-post interview contamination and no control groups. Furthermore, other studies looking at the relationship between preoperative fear and postoperative emotional reactions have found a positive linear relationship (e.g., Cohen & Lazarus, 1973; Johnson, Leventhal & Dabbs, 1971; Sime, 1976). However, the work of Janis and his associates has encouraged a number of other investigators to explore the mechanisms by which information affects outcomes.

More recently, cognitive researchers have proposed other theories about how information assists the individual in dealing with stressful situations. Most of these place information in a position of altering attitudes or perceptions one may have about oneself and the situation involved (e.g., perceived control over the situation, feelings of competence, and predictability of the situation), which leads to anticipatory coping efforts and reduction of emotional upset through appraising the situation as less threatening (Krantz, 1980; Lazarus, Averill & Opton, 1974). The research that has accumulated over the past 15 years has demonstrated that the relationship between information and outcome is quite complex and is dependent on many factors. The literature review which follows presents research which has addressed some of this complexity.

Educational approaches used with bypass patients. Although a number of studies have explored the effect of educational efforts on a variety of cardiac patients (e.g., valve replacement, heart failure and heart attack patients), this section will focus on studies done with cardiac bypass surgery patients. Since no research on information factors currently exists for P.T.C.A. patients, the cardiac bypass patients are the group most comparable to the P.T.C.A. patients on baseline medical condition and psychological status. Several studies have examined the effect of cardiac education programs on coronary bypass patients. These studies have addressed one or both of the following questions: 1) Do patients who participate in cardiac education programs gain knowledge? and 2) What effect does education have on psychological, behavioral and medical outcomes that are important for this patient group? The next section presents three major studies which have addressed these issues specifically in cardiac bypass surgery patients.

Linde and Janz (1979) examined the effect of a structured cardiac education program on a sample of 55 patients who were having valve replacement or coronary bypass surgery. The education included information on coronary artery disease, the procedures patients typically go through, medications, dietary regimens and risk-factor modification. Individual nurses provided the education and no group instruction was given. Patients in both surgery groups completed a

pretest of information upon admission. Three posttests were given, one at discharge, and one at 1 and 3 months after discharge from the hospital. The tests included multiple choice and true-false items, with specific items changed depending on the patients' particular surgical group. In addition, patients were given a separate questionnaire in which they were asked to name the cardiac medications taken, the dosage and purpose. Of the original 55 patients, 7 were lost to follow-up, leaving a final sample of 30 valve replacement and 18 coronary bypass surgery patients. Both groups showed a significant gain in knowledge from pretest to the first posttest. Neither group showed significant changes between the discharge posttest and the 1 and 3 month tests. Compliance was the major outcome in this study, defined as the patient's report of following regimens, laboratory tests, and number of clinic appointments kept. The authors reported that the patients were more compliant, but the statistical tests were not performed between information level and compliance, but between the level of compliance in their study compared to compliance levels reported in other studies using similar measures. This fact makes it difficult to interpret the results, since conditions between the studies may not have been comparable.

Other research has focused on the form in which the educational program is presented. Christopherson and Pfeiffer (1980) presented cardiac information in the form of a

comprehensive booklet to patients who were to have bypass surgery and varied the time at which patients read the materials. The researchers solicited participation from patients who were told they needed bypass surgery following coronary angiography. Forty-one out of 146 consecutive patients participated in the study. Analyses revealed that the sample of 41 did not differ significantly from the non-participating patients in age, education, or on major medical variables. Patients were randomly assigned to two groups. One group (group 3) read the booklet immediately after agreeing to participate in the study. Group 2 received the booklet on the day of admission to the hospital for their surgery. All patients were given the Speilberger State-Trait Anxiety Scale upon entry into the study. Twelve patients agreed to be in the study but refused to read the booklet. The authors surmised from responses given by patients when asked why they did not read the booklet that their decision possibly reflected an avoidant coping style. Eight of these were from Group 2 and four were from Group 3. These 12 patients became a separate "non-random control group", Group 1. Group 3 then included 18 patients who read the booklet immediately, while the 11 patients in Group 2 read it 1 to 2 days pre-operatively. The test of information was in multiple choice format and based on the information contained in the booklet. Since only one form of the questionnaire was constructed, patients were given the same

version of the test post-operatively, which occurred on the average of 7 to 10 days after surgery. All three groups showed gain in knowledge from pretest to posttest, but the only the groups which read the booklet demonstrated a mean difference which reached significance. A comparison of the posttest scores of the groups showed no significant difference in scores among the three groups. The major outcomes used in this study were postoperative scores on state anxiety and recovery variables such as time spent in the intensive care unit and hospital stay. All groups did demonstrate lower post-operative scores on state anxiety as compared with pre-operative scores, but Group 2 was the only group with a significant mean difference. Patients in Group 2 also spent significantly fewer days in intensive care. These findings, however, may have been influenced by the fact that patients in Group 2 were significantly younger than patients in the other two groups. The authors did not attempt to reanalyze the data controlling for this difference in age. They concluded that information gain is not dependent on when the patient gets information before a procedure, but that giving information in the form of a booklet does contribute significantly to better preparation.

In a well controlled study of education in coronary bypass patients, researchers at Stanford University explored the effect of different educational approaches on information gain, and the relationship of cardiac knowledge level

to anxiety and behavioral outcomes (Barbarowicz, Nelson, De-Busk & Haskell, 1980). Patients were randomly assigned to receive either a slide-sound teaching program developed by the researchers, or the standard approach, which included informal, unstructured contact with individual nurses. Coronary artery bypass patients from three hospitals were eligible to participate in the research. Three hundred and forty-two patients consented to participate and were randomized into the two educational groups. Fifty-six patients were eliminated from each group because they did not complete all the in-hospital questionnaires, leaving 124 in the slide-sound teaching group, and 106 in the standard teaching group. Cardiac knowledge was measured using a self-administered test and was assessed before teaching, at discharge, and at 1 and 3 months after hospital discharge. Anxiety was measured (using the State-Trait Anxiety Index of Spielberger and associates) before teaching and at 1 month post-surgery. A structured interview was used to measure health related behaviors, which included information about diet, weight, physical activity, smoking and return to work. These behaviors were assessed before teaching began, and at both 1 and 3 months after discharge. Since 31 patients were rehospitalized during the 3-month follow-up, the authors chose to analyze them separately. Knowledge increased in all teaching groups during hospitalization, but increases in the slide-sound group were significantly greater than those in

the standard approach for both patients who were hospital-
ized and those not hospitalized after discharge. In regres-
sion analyses using discharge knowledge level as the depen-
dent variable, variables such as sex, age, education, social
class and a variety of medical parameters were not related
to information gain. The only significant factors were
baseline knowledge and teaching group. Anxiety had de-
creased significantly by the first month after discharge.
There were no differences between teaching groups, and anxi-
ety was not related to knowledge scores. There were no sig-
nificant differences between the teaching groups on reported
health behaviors. There was no relationship between knowl-
edge level and health behaviors in the rehospitalized pa-
tients, but the non-rehospitalized patients with higher dis-
charge knowledge reported higher levels of activity at both
1 and 3 months after discharge. The authors concluded that
knowledge gain can be enhanced by using slide-sound methods
of teaching, but that different teaching methods have little
effect in reducing anxiety or increasing health behaviors,
although these factors did change significantly over time.

The three preceding studies clearly demonstrate that
bypass patients do gain information when exposed to cardiac
education programs. Two of the studies (Barbarowicz et al.,
1980; Christopherson & Pfeiffer, 1980) suggest that optimal
knowledge gain results from educational approaches which in-
clude both printed and audiovisual materials. Although

these studies addressed information gain, only one of these studies (Barbarowicz et al., 1980) explored additional factors which could modify what is learned, The factors which were considered (age, education, social status) were not significantly related to information gain. None of the studies examined psychological variables which have been related to information processing in other research. The relationship of psychological factors to information gain will be explored thoroughly in other sections of this literature review.

The effect of cardiac education on psychological, medical and functional outcomes is more difficult to ascertain from these three studies. Anxiety has been a major psychological outcome studied in cardiac education with bypass patients. The studies reviewed do not support the speculation that effectiveness of cardiac education can be reliably assessed by measuring a reduction in anxiety. The results of Christopherson and Pfeiffer (1980) did suggest that patients who learned more spent less time in the intensive care unit, although the results are questionable because patients in that group were younger. Higher information level was related to higher level of activity in the study by Barbarowicz and associates (1980), but was not related to other factors such as return to work, smoking behavior, or dietary habits. Linde and Janz (1979) did report that knowledge gain was associated with better compliance, although they

measured compliance by comparing their group means to those of other researchers. These results demonstrate that the knowledge gained through cardiac education may be only weakly related to outcomes which could be used to substantiate the effectiveness of the educational effort.

It is worth emphasizing again that the patients examined in these three studies have baseline medical situations comparable to the group of P.T.C.A. patients studied in this current research. In addition, the type of education used in the current research combines a written booklet and audiovisual presentation which is similar to the approach used by Barbarowicz and associates. One major difference between the educational experience of the bypass patients and the P.T.C.A. patients in the current research is the length of time patients are exposed to the cardiac education during hospitalization. The time of in-hospital exposure for the three bypass studies ranged from 7 to 14 days, whereas the P.T.C.A. patients generally are hospitalized for only 3 to 4 days. In addition, P.T.C.A. patients do not generally experience the immediate trauma or recuperation process typically faced by bypass patients. These difference are important to bear in mind when comparing the findings from these studies to the current research with P.T.C.A. patients.

Coping Style and Information

Many efforts have been made to develop conceptualizations which describe and categorize experiences we commonly label as "coping." Some of these categorical systems have attempted to conceptualize coping as being composed of two opposing types of mechanisms. A differentiation has been made between repression or avoidance as one end of this continuum, while a variety of labels, such as sensitization, vigilance or isolation, have been used to identify the opposite end (Lazarus, Averill & Opton, 1974). The plurality of words used to label this continuum reflect the variety of ways in which these polarities have been conceptualized and measured. One of the clearest distinctions in this research has been whether the continuum is conceptualized and measured as an "episodic" or as a "dispositional" construct (Cohen & Lazarus, 1979). The former involves assessing coping which is specific for a particular situation or set of circumstances, while the latter refers to measuring the tendency of an individual to use a coping mechanism with some consistency across situations. An example of a dispositional measure of avoidance-vigilance would be the Sentence Completion Test of Goldstein (1959) in which the subject is asked to complete sentences which begin with phrases containing aggressive or sexual content. Avoiders would be expected to ignore the threatening connotations of the stem, while vigilant subjects would respond to them and produce phrases

which acknowledge or enhance the threatening aspects implied by the words contained in the stem. Measured in this way, the concept of avoidance-vigilance represents an enduring style, describing a disposition to use particular coping mechanisms with some consistency in stressful situations. Others have assessed avoidance-vigilance using questions which are situation specific, thereby producing an episodic measure which reflects behavior only within a specific set of circumstances, such as preparing for surgery (Cohen, 1975; Cohen & Lazarus, 1973; Hitchcock, 1982; La Montagne, 1982). The sections which follow present studies which have conceptualized a coping continuum with avoidance or repression at one end, and vigilance, sensitization or isolation at the other end, and have measured these dimensions as episodic constructs, dispositional constructs, or both.

Studies using episodic measures of coping. The studies in which avoidance-vigilance has been assessed as an episodic measure have relied primarily on interview questions designed to elicit information about coping in a particular situation. One study used both dispositional and episodic measures of avoidance-vigilance. Cohen and Lazarus (1973) examined the relationship of active and dispositional coping to recovery in 61 patients undergoing hernia, cholecystectomy or thyroid surgery. They measured avoidance-vigilance in three ways, using the Goldstein Sentence Completion Test and Epstein and Fenz's (1967) modified repression-sensitization

scale (both dispositional measures), and a structured interview format (an episodic measure). They found that patients who knew the most about the operation they were going to have (the vigilant group determined from the interview measure) had the slowest and most complicated recoveries. Patients classified as avoidant had the best recovery outcomes. Patients categorized as vigilant using the Sentence Completion Test took significantly more pain medications than the other groups. In explaining these findings, Cohen and Lazarus speculated that patients who seek information may be frustrated if they find themselves in situations in which they do not have control over what is happening and cannot exert mastery over the situation, which is often the case during the period of hospitalization immediately after a surgical procedure. An extremely interesting finding of this study was that the dispositional and episodic measures of avoidance-vigilance had very low correlations, suggesting that dispositional and episodic measures do tap dimensions which are differentially related to outcome. The findings related to these coping measures were replicated in a later study by Cohen (Cohen, 1975).

Sime (1976) studied 57 patients who were having one of eight different types of abdominal surgery to determine how information affected coping processes. Based on the theoretical perspective of Janis and Leventhal described earlier, she hypothesized that vigilant patients would not profit

from additional information, that the middle group might be helped by added information, and that avoiders would be stimulated by information to begin the process of the "work of worry." Sime measured avoidance-vigilance using interview questions that probed into the specific areas in which patients sought information and whether they still wanted particular kinds of information. She also measured level of preoperative fear and the amount of information patients appeared to have both before and after the surgery. Sime found that avoidance-vigilance was significantly related to level of knowledge (the more vigilant patients knew more) but was not related to days spent in the hospital after surgery or use of sedatives and analgesics. She did, however, find differential recovery rates that were related to interactions between levels of fear and information. These latter results will be described in more detail in the section which presents studies relating anxiety to information.

Hitchcock (1982) studied avoidance-vigilance in 90 patients who were about to undergo gallbladder surgery. The researcher measured avoidance-vigilance and information-seeking utilizing an interview technique, and assessed other psychological dimensions using scales from the California Personality Inventory (CPI). Patients were randomly assigned to one of three treatment groups: 1) a group receiving a relaxation tape; 2) a group assigned to listen to a cognitive tape, which included information about sensory ex-

periences that might occur during the procedure; and 3) a group which got procedural information only. There was also a no-treatment historical control group. The outcomes measured included patient self-report of physical and emotional recovery one month after the surgery, length of hosptial stay, pain medications used, and complications experienced. Hitchcock found that vigilant patients experienced better recoveries than avoiders, as assessed by the episodic measure. Patients high on CPI scales of flexibility (Fx) and achievement via independence (Ai) had better recoveries than patients with low scores on these scales, and benefited more from the treatments in which they participated. The researcher found that patients benefited the most from treatments which were complimentary rather than congruent with their style, a result which contradicts other research (Cromwell et al., 1977; Shaw et al., in press).

Harris (1981) approached the construct of avoidance-vigilance by conceptualizing it as a set of cognitive and behavioral information search patterns, and operationalizing it as the frequency and duration of various seeking and avoiding behaviors and thought processes demonstrated by subjects as they performed various tasks in laboratory situations. The researcher classified subjects as avoidant or vigilant using their cognitive and behavioral responses in processing information during tasks in which there was a possibility of aversive stimuli in the form of electric

shock. Previous literature suggested that subjects who were more conceptually complex should seek more information about their environments (Karlins & Lamm, 1967). In the experiment, subjects were rated as either conceptually complex or simple, and randomly assigned to experimental conditions in which they were put into a situation where the shock was predictable or not predictable, with or without a cognitive task, and either given or not given the opportunity to have access to information about when the shock would occur. Avoidance-vigilance was measured by tracking how many times and for how long subjects pressed a button which gave information about the shock, and how often subjects reported they thought about the shock. Using 120 female college students from an introductory psychology course, Harris found that conceptually complex subjects did not tend to be more vigilant. Results did demonstrate that conceptually simple subjects made more vigilant responses when they were in conditions where the shock was unpredictable and there was no cognitive task to be done. These results support the interpretation of Cohen and Lazarus (1973) suggesting that vigilant subjects have poorer outcomes after surgery because their active style exerts little control over the course of events.

Dispositional coping measures. One measure of coping that has been consistently conceptualized and measured as a dispositional coping measure is repression-sensitization.

Repression is one of the oldest and possibly most studied concepts in the history of psychology. In the most general terms, repression can be described as an unconscious process which allows the individual to remain unaware of uncomfortable or anxiety producing internal impulses or feelings. Psychoanalysts have discussed repression in the literature for many years, but it was not until the late 1950's that attempts were made to develop more systematic ways of measuring this as a defensive style. In 1960 researchers at Duke University constructed two scales relating MMPI items to defensive style (Altrocchi, Parsons & Dickhoff, 1960). These scales related two indices: the expressor index (ExI) and the repressor-sensitizer index (R-SI). In an effort to improve these measures and make them more psychometrically sound, Byrne, Barry and Nelson (1963) combined the indices into one scale and refined the set using item analysis. Although the Byrne's measure of repression-sensitization has been the most frequently used scale for measuring the construct, it has been criticized on the grounds that it is not unidimensional (Golin, Herron, Lakota & Reineck, 1967; Carlson, 1979), and is highly correlated with measures of anxiety (Lefcourt, 1966; Dahlstrom, Grant & Dahlstrom, 1975; Highland, 1980). Other measures of repressive style have been developed which do not utilize items from the MMPI, such as the Goldstein Sentence Completion Test (Goldstein, 1959) and the Rorschach Index of Repressive Style (Levine &

Spivack, 1964). This latter measure is based on material generated from the Rorschach projective test which is scored to reflect whether the content of the subject's response indicates repression or isolation, (e.g., Gardner, Holzman, Klein, Linton & Spence, 1959; Levine & Spivack, 1964; Luborsky, Blinder & Schimek, 1965). This measure has been used less frequently than the Byrne Repression-sensitization scale or the Goldstein Sentence Completion Test because it is based on a projective technique, making it more difficult to administer and to score reliably as compared to instruments based on questionnaires. Correlations between the Rorschach Index of Repressive Style and the MMPI repression-sensitization measure have been reported to be quite low (Levine & Spivack, 1964), which is problematic for instruments supposedly measuring the same construct (Cohen & Lazarus, 1979).

Some researchers have attempted to modify the Byrne Repression-sensitization scale to adjust for the high correlations with measures of anxiety (Epstein & Fenz, 1967). Others have chosen to use combinations of other measures. An alternative method for measuring repressive style was developed by Weinberger, Schwartz and Davidson (1979) which combines the Taylor Manifest Anxiety Scale (Taylor, 1953) and the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960). The researchers speculated that repressors would experience anxiety in stressful situations, but be-

cause of the trend in their style to repress anxious feelings combined with their tendency to create a favorable impression, they would report that they were not anxious. However, there is another group which would also report low levels of anxiety in a stressful situation because they are in fact not experiencing anxiety. Those in this latter group are not repressing anxiety, but are approaching the situation with minimal, controlled levels of anxiety. They are not trying to create an impression of being in control because they are in control. Weinberger and his associates reasoned that a measure of social desirability would distinguish these two groups which appear to have similar, low levels of anxiety. Combining results on anxiety and social desirability measures would distinguish the "true repressors" from those who were truly "low anxious" and were not repressing. Weinberger and his associates hypothesized that the truly "low anxious" individuals would perform well on behavioral and cognitive tasks because anxiety would not be interfering with their performance. The "true repressors," on the other hand, would tend to underreport their actual level of anxiety, which would nonetheless lead to poorer performance on cognitive and behavioral tasks. In their studies, the researchers did in fact find significant differences between these groups on self-report, physiological and behavioral measures. The "true repressors" demonstrated poorer performance on cognitive tasks, and a greater dis-

crepancy between physiological measures of their reaction to the situation (levels indicating high arousal) and their report of emotional disturbance (measures of perceived anxiety). Conversely, the truly "low anxious" group demonstrated excellent performance on cognitive and behavioral tasks, and showed congruence between physiological measures of emotional disturbance and their self-reports of anxiety. This way of measuring repression is more aligned with the classical concept of repression in which repressors are portrayed as individuals who are unconsciously attempting to allay anxious impulses that are emerging because of a threatening situation. More recent studies have replicated the findings of Weinberger and associates, demonstrating similar inconsistencies between self-report of arousal, measures of facial anxiety, and other physiological measures of arousal (Asendorpf & Scherer, 1983).

Studies using dispositional coping measures. The following sections will include studies which have examined the relationship between dispositional measures of coping and cognitive performance, the effect of coping on outcome in surgical patients and cardiac patients, and the effect of information and coping on patients undergoing a stressful medical procedure.

Coping and cognitive performance. Using the Byrne measure of Repression-sensitization, Bergquist, Lewinsohn, Sue

and Flippo (1968) examined short-term memory capacity in a group of subjects and found that sensitizers tended to have better short-term memory. However, other studies also using the Byrne's scale have not been able to replicate these findings (Bergquist, 1972; Bergquist, Lewinsohn & Benson, 1971). There is conflicting evidence as to whether repressors have higher verbal ability than sensitizers, with some studies supporting this finding (Clark & Neuringer, 1971), while others have found no difference (Lomont, 1965). Other research suggests that repressors and sensitizers do differ in the ways in which they process information. Luborsky, Blinder & Schimek (1965) used a Rorschach-based method to assess dispositional coping and found that repression was associated significantly less scanning of emotionally laden pictures. Isolation was also associated with recall of more sexual content. One study demonstrated that repressors were less open to new information (Weissman & Ritter, 1970) while another showed repressors tended to be less flexible in their cognitive processes when performing concept information tasks (Bergquist, Lloyd & Johansson, 1973). Markowitz (1969) found an interaction between repression-sensitization measured with the Byrne scale and stress condition on a learning task. In the ego threat condition, repressors tended to learn significantly less than in neutral conditions, while sensitzers learned significantly more in ego threat conditions as compared to the neutral conditions.

Dispositional coping and surgical studies. Early surgical studies had suggested that patients who seek information would do better during recovery because they would learn about the procedure and develop effective ways to deal with the threat of the surgical situation (Janis, 1958). Andrew (1970) studied 40 surgical patients undergoing hernia repair to to determine the relationship between the type of information given, avoidance-vigilance coping style and post-surgical outcome. The researcher measured avoidance-vigilance using the Goldstein Sentence Completion Test, dividing patients into three groups representing use of avoidance, vigilance or a mixture of these extremes. Of the 18 male patients who did not receive the special information instruction, the six who were classified as vigilant had better post-surgical recoveries, as measured by shorter length of stay in the hospital and lower medication usage. The avoidant group had slightly better recovery outcomes than the middle group, which had the worst recovery. Andrew found that the avoidant group requested more pain medication when given information before the procedure, whereas the vigilant group did well irregardless of whether they received information preoperatively. Length of hospitalization was not affected by the instruction condition. These results supported the view that information seeking should lead to better preparation for and outcomes during a stressful event such as surgery.

DeLong (1970) examined avoidance-vigilance in relation to the type of instruction given to women who were having hysterectomies or cholecystectomies. Patients were assigned to one of two instruction conditions. One condition included specific instruction about the procedure while the other was a more generalized instruction about hospital practices. Avoidance-vigilance was measured using an abbreviated version of the Goldstein Sentence Completion Test and the sample was divided into three groups (avoiders, vigilants and the nonspecific coping group). The post-surgical outcomes used were medication usage, length of stay in the hospital, and number of patient complaints. In analyses of patients who only received the general instruction, the middle group had the best outcomes for the medical recovery variables, followed by the avoidant group, with the vigilant patients having the poorest outcomes. The vigilant patients were also found to complain significantly more than the avoiders. When the effect of type of instruction was considered, the author found that variance in recovery only occurred for the vigilant group, with the best recovery in that group associated with patients who heard tapes of specific information. Patients in the avoidant group who received specific instruction did complain more after surgery, but there were no differences in this group on the recovery outcomes. The author suggested that giving general information to the vigilant patients heightened rather than reduced their anxiety

level since they were seeking specific information relevant to their current condition.

Two studies of surgical patients suggest that vigilant patients may tend to have poorer outcomes. In their study of dental surgery, George, Scott, Turner and Gregg (1980) found that patients who were more vigilant had the slowest rate of recovery. Vigilance was the strongest predictor of slower healing rate even when the researchers controlled for the effects of the physical trauma of surgery. In another study of patients undergoing open heart surgery, Kornfield, Heller, Frank and Moskowitz (1974) found that patients who demonstrated postoperative delirium, a phenomenon commonly seen in these heart surgery patients, tended to be those patients who were vigilant-like in their need to have dominance and control over their situation.

Dispositional coping and cardiac patients. Although much of the research on repression-sensitization in the medical area has focused on cancer patients, there are some studies which have examined the style and its effect on cardiac patients. Cromwell, Butterfield, Brayfield and Curry (1977) randomly assigned patients admitted to the Coronary Care Unit for suspected myocardial infarction into conditions in which the amount of information, the level of stimulation, and the degree to which patients could participate in their treatment were experimentally controlled. Patients in the high information group received detailed tapes about the nature of a

heart attack, its causes, treatments, and the course of re-
covery. These patients were also provided with literature
from the American Heart Association on a variety of cardiac
issues. Patients in the low information condition were pri-
marily given support and reassurance. If they asked specif-
ic questions these were referred to the physicians who were
instructed to give answers that were as general as possible.
The researchers measured repression-sensitization using the
Ullman measure, which has been used rarely in the litera-
ture. Correlations reported by Cromwell and associates be-
tween this measure of repression and their measures of anxi-
ety indicate that it is highly correlated with anxiety.
They measured a variety of outcome variables, including lab-
oratory blood work, ratings by the staff of cooperation,
number of heart monitor alarms, occurrence of rehospitaliza-
ton in the first three months after discharge, and general
mood and depression levels of the patients. They found that
the shortest stays in the CCU were associated with patients
who were in the high information-low diversion-high partici-
pation group. This suggests that if patients are given spe-
cific behaviors to perform along with information about the
situation, they tend to do better. Repression-sensitization
was not related to a test of information gain given to all
patients. However, the correlation between the information
test and the information condition patients were in was mod-
erately low (0.37) suggesting that a number of factors may

have influenced information acquisition. From analyses of combinations of information level and repressive style Cromwell and associates found that sensitizers from the low information conditions and repressors from the high information conditions had a higher number of heart monitor alarms and were rated as less cooperative by the staff. They speculated that these negative outcomes occurred because of a "mismatch" between the coping style of the individual and the characteristics of the information condition. More specifically, sensitizers should be comfortable in high information conditions because there is more information and detail on which they can focus. Because of their coping style, repressors would be more likely to feel comfortable in conditions where information level and amount of detail is minimal. In analyses of postdischarge outcomes, sensitizers were more likely to have another heart attack in the first 12 weeks after hospitalization. Repressors were more likely to return to work quicker than the other groups, while patients from the high information condition had the slowest return to work.

In a study of 30 patients recovering from myocardial infarction, Shaw, Cohen, Doyle & Palesky (in press) measured repression-sensitization using both the Byrne Repression-sensitization scale and the approach developed by Weinberger and associates (1979) combining the Taylor Manifest Anxiety and the Marlowe-Crowne Social Desirability scales. They

found that compared to sensitizers, repressors tended to gain less information about coronary artery disease risk factors. The researchers followed patients for six months after discharge and found no correlation between repression, sensitization or knowledge level alone and any medical or psychosocial functioning outcomes. However, when they used combinations of information level with repressive style similar to those used by Cromwell and associates (1977), a number of findings emerged. Repressors with high levels of risk information (more than the mean score for all patients) at discharge reported significantly more medical complications and poorer psychomedical functioning (sleep disturbance, depression) during the six months. Sensitizers with low levels of risk factor information reported lower levels of social functioning (decreased recreational, social and work activity). These findings coincide with those of Cromwell and associates in which "mismatch" between coping style and information condition led to undesirable outcomes for their patients.

Dispositional coping and stressful medical procedures. Two studies have examined how different kinds of preparation for patients undergoing stressful medical procedures interact with coping style and influence outcomes. Shipley, Butt, Horwitz and Farby (1978) tested the effect of repeated exposure to a preparation videotape on patients about to undergo an upper-gastrointestinal endoscopy for the first time. The

extinction/habituation hypothesis would predict that decline in the fear response should be a function of the number of times an individual views a model going through the stressful event. The researchers randomly assgined 60 endoscopy patients to one of three preparation conditions: a control situation in which a medical videotape unrelated to the procedure was shown to patients (E0 group), a condition in which subjects had one viewing of a videotape portraying a moderately fearful patient undergoing endoscopy (E1 group), and a group which viewed the endoscopy videotape three times before the procedure (E3 group). Patients in all groups were given extensive information about the procedure by staff members. Unfortunately, patients' level of information was not assessed before or after the videotape presentations so it is impossible to determine exactly how much information patients had about the procedure. Shipley and associates were also interested in how the amount of videotape exposure interacted with patient status on Epstein and Fenz's measure of repression-sensitization, Spielberger's STAI, physician-nurse ratings of patient anxiety before, during and after the procedure, and patient usage of pain sedatives. They predicted that there would be a linear relationship between style and reactivity for sensitizers, with patients in the E0 condition demonstrating high levels of anxiety and physiological reaction (measured by heart rate), while those in the E1 condition would show moderate

reactions, and sensitizers viewing the videotape three times would demonstrate the least amount of upset. They hypothesized that repressors would demonstrate an inverted-U relationship between level of upset and number of videotape exposures. That is, repressors in the E0 condition were expected to have low levels of anxiety and physiological reactivity as a result of their effective repressor coping mechanism against anxiety. Repressors viewing the tape once would have reaction levels equal to the high reaction of the sensitizer E0 group because their defense would have been broken down by the stimulus. Repressors in the E3 group, whose fear was extinguished by repeated exposure to the videotape stimulus, would demonstrate low levels of reactivity similar to the E3 sensitizer group. In their first analyses, the researchers examined the 3 experimental groups without considering the effect of repression-sensitization. They found that the E3 group had lower physician-nurse rated anxiety before the procedure as compared to the E0 group, and the E3 and E1 groups both had rated anxiety levels lower than the control group during the procedure. The E3 groups used fewer tranquilizers than the other groups, and had the lowest heart rate during the first five minutes of the procedure. Both experimental groups had STAI state anxiety scores lower than the control group after the procedure, and the control group expressed significantly more annoyance about the endoscopy in post-procedural interviews. In anal-

yses which included the repression-sensitization dimension, the researchers found the linear trend predicted for sensitizers on measures of heart rate during the first five minutes of the procedure, with the E0 group having the highest rate, followed by the E1 and E3 groups. The repressor groups demonstrated the predicted inverted U-shaped relationship between style and heart rate during the first five minutes and for use of sedatives. Repressors from the E0 and E3 groups had the lowest heart rates and use of sedatives, while the E1 group had significantly higher levels on each measure which were comparable to the outcomes for the E0 sensitizer group. Sensitizers in groups E1 and E3 reported significantly less state anxiety than the control group. However, there were no differences in state anxiety across the repressor groups.

In 1979, Shipley, Butt and Horwitz repeated their 1978 study, this time examining the effect of previous endoscopy experience on the relationships between coping style and outcome. They studied 36 patients who had experienced endoscopy before, the average for the group being about 2 procedures per patient. The researchers found that sensitizers showed the same decline in heart rate during the first five minutes of the procedure as a function of videotape viewing found in the previous study. However, the repressor group demonstrated a linear increase between heart rate and videtape viewing, with the E3 group demonstrating the highest

levels of heart rate over the first five minutes, followed by the E1 group, and the E0 group showing the lowest heart rate levels. The E3 and E1 sensitizer groups also differed from the control group on physician-nurse rated anxiety before and during the procedure, and the E3 group differed from the control group on rated anxiety after the procedure. There were no differences in the repressor groups. No differences were found in any of the groups for STAI state anxiety or use of sedatives.

Summary of the coping research. These studies suggest that coping is important to consider in studying the impact of information on medical outcomes. It appears that coping style can affect the amount of information gained and mediate short term recovery outcomes. It also appears that the level and type of information may interact with coping to produce differential outcomes. Although there is some disagreement between the studies, it appears that vigilant subjects tend to have poorer outcomes in the short term, both for psychological and physical outcomes, especially if they perceive that the information they are given is not useful. These findings have been supported by another study in which the authors performed a meta-analysis on a variety of studies which considered the effects of avoidance and vigilance on outcome (Mullen & Suls, 1982). They found that vigilant subjects tended to have worse short term outcomes and better long term outcomes, while the reverse was true for repres-

sors. Since it appears from these studies that disposition-
al and episodic measures of coping may be related to differ-
ent psychological and medical outcomes, measures of both ep-
isodic and dispositional coping need to be included in stud-
ies of health outcome. The results of all of the studies
taken together indicate that repressors appear to be comfor-
table with minimal levels of preparation and information
about stressful happenings. When the experience is not nov-
el (as in the Shipley et al., 1979 study) or the information
presented challenges the defenses of the repressor (as in
the Cromwell et al., 1977 and Shaw et al., in press, stud-
ies), repressors have more difficulty coping with this in-
formation overload. On the other hand, sensitizers seem to
respond better as the amount of information and stimulus ex-
posure increases, and tend to have negative outcomes when
they do not have high levels of information to match their
coping style (as in Shaw et al., in press)

Studies of Anxiety and Learning

Anxiety is another potentially important factor that may in-
teract with information levels and influence medical, func-
tional and psychological outcome after P.T.C.A. The term
anxiety has been used to describe an unpleasant emotional
state in which an individual feels apprehensive, worried or
tense. A distinction has been drawn in the literature be-
tween "state" and "trait" anxiety (Cattell & Scheier, 1961;

Spielberger, 1966). State anxiety refers to the arousal which is invoked when an individual perceives that a particular stimulus or situation may be harmful. Trait anxiety refers to the difference from individual to individual in proneness to react anxiously to situations (Spielberger, 1966). Over the years there have been disagreements as to the validity of such a distinction, revived recently by Allen and Potkay (Allen & Potkay, 1981; Allen & Potkay, 1983b; Zuckerman, 1983). Research on anxiety does provide reasonably strong support for maintaining a distinction between state and trait anxiety, since many studies have demonstrated that state anxiety does change in situations where trait does not, and they are often related differentially to outcome (Spielberger, 1983a; Zuckerman, 1983). These trends have not been found as consistently in research on other personality constructs (Allen & Potkay, 1983b).

Measures of anxiety. A variety of measures have been constructed to assess anxiety. One of the most widely used is the State-Trait Anxiety Inventory (STAI) developed by Spielberger and Gorsuch in 1966 and later modified by Spielberger, Gorsuch, Lushene, Vagg and Jacobs in 1977 (see Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983). This instrument yields a measure of both state and trait anxiety. Other measures have been contructed which focus on either trait or state anxiety separatly. Two instruments assessing trait anxiety which have been used frequently are the Taylor

Manifest Anxiety Scale (Taylor, 1953) which is based on items from the MMPI, and the IPAT scale (Institute for Personality and Ability Testing) developed by Cattell and Scheier (1963). The measurement of state anxiety has varied considerably. Some researchers have measured it by asking patients to rate the level of anxiety they feel in a particular situation, or the amount of tension, fear or worry they have about an event (Cohen & Lazarus, 1973; Johnson, Leventhal & Dabbs, 1971; Sime, 1976). Others have inferred state anxiety from adjectives used by subjects to describe their current feelings, such as the Adjective Generation Technique (AGT) (Allen & Potkay, 1983a; Potkay & Allen, 1973) and the Today Form of the Multiple Affect Adjective Check List (MAACL) (Zuckerman, 1960).

Theories relating anxiety and learning. Studies examining the relationship between anxiety and learning have been reported extensively in the psychological literature. Two major theories have been proposed to organize these findings. The Spence-Taylor Drive Theory (Spence & Spence, 1966) is an extension of Hullian learning theory, and portrays anxiety as the emotional state or response to a noxious situation, the strength of which depends on the relationship between this emotional drive state and habit strength (in terms of human learning, the likelihood of making a correct choice as compared to other possible choices). In the context of human learning, this theory predicts that for simple tasks, a

highly anxious subject would perform better than a low anxious subject because the proportion of correct choices (habit strength) would dominate. For more difficult learning tasks, error tendencies would increase, and the theory would predict that highly anxious subjects would have poorer performances than low anxious subjects. For intermediate level tasks, the stage of the learning process becomes important. Highly anxious subjects would be expected to do worse than low anxious subjects in the earlier stages of learning, but as correct responses become more predominant over time, the performance of highly anxious subjects would be facilitated and they would have performances better than or equal to low anxious subjects later in the learning cycle (Heinrich & Spielberger, 1982).

This theory has been fruitful in explaining many findings relating anxiety to learning, but has proven to be less adequate in studies which focus on variations in the learner and the situation. Spielberger has expanded the Drive Theory to account for research which has included other factors such as intelligence and perceived threat in the situation (Spielberger, 1972a, 1972b; Spielberger, Gorsuch & Lushene, 1970). He predicted that intelligence would have differential effects over various levels of anxiety. More specifically, Spielberger hypothesized that in subjects with high intelligence, high anxiety would facilitate performance in most tasks except for the very difficult ones, and that even

this deficit would be overcome in more advanced stages of learning. For moderately intelligent subjects, high anxiety would facilitate performance on simple tasks, and on moderate tasks in the later stages of learning, but have detrimental effects on difficult learning tasks, regardless of the stage of learning. High anxiety would decrease the performance of low intelligence subjects on all tasks regardless of difficulty level, with the exception of simple tasks, where learning would be facilitated only after the basic actions in the task had been mastered.

Along with level of intelligence, Spielberger and his associates also incorporated the distinction between state and trait anxiety in their theory of anxiety and learning. They predicted that individuals high on trait anxiety would be more likely to perceive situations as threatening, and respond with greater levels of state anxiety compared to subjects who were lower on trait anxiety. Because these high trait anxiety individuals would tend to appraise situations as more stressful, they would be susceptible to situations they perceived as having high psychological or ego threat. In situations where interpretations of danger were less influential, such as discrete events involving physical danger (e.g., possibility of attack by a vicious animal), low and high trait anxiety subjects would be expected to react with similar levels of state anxiety (Heinrich & Spielberger, 1982). Research on the effect of anxiety on

learning has generally upheld the theoretical predictions generated from the Trait-State Anxiety Theory. Selected studies from general research on anxiety and learning will be presented next, followed by studies from the medical literature which have explored the effect of anxiety on learning, and the effect of information and intervention on anxiety levels.

Studies of anxiety and learning. Katahn and Branham (1968) studied how trait anxiety affected the acquisition and generalization of information in a learning task. Their results suggested that high anxiety interferes with generalization of information (considered to be a more difficult task), whereas it has less effect on acquisition of information (which is considered to be a less complex task than generalization). However, low anxious subjects did not perform better than high anxious subjects on the generalization task, which would be predicted from the Drive Theory. In examining the effects of competing correct and incorrect responses in a problem solving situation, Tecce (1965) found a curvilinear relationship between level of anxiety and performance. When correct responses dominated, there was no difference in performance between low and high anxious subjects. When incorrect responses dominated, high and low anxious subjects performed significantly worse than the moderate anxiety group. From these studies, it appears that the Drive Theory prediction that high anxious subjects will

have poorer performance on difficult tasks is upheld, but the prediction that low anxious subjects will perform better as task difficulty increases is not supported. It is also important to note that these studies suggest that anxiety has a minimal effect on acquisition of information, which is most similar to the learning that occurs in cardiac education programs. Anxiety may a less important factor in P.T.C.A. education.

In examining the relationship of the stage of learning to anxiety, O'Neill, Spielberger and Hansen (1969) found that high A-State (state anxiety) students made more errors in the early stages of learning difficult mathematical problems, but surpassed low A-State students in later stages. This would suggest that in difficult tasks high anxious subjects may surpass the performance of low anxious subjects only if the task extends over a period of time. Other studies have explored the effect of a stressor on anxiety and learning. In studies where stress was created by having a partner in the learning task (producing the threat of unfavorable comparison), high A-Trait subjects performed better than low A-Trait subjects in low stress conditions, whereas the converse was true for high stress situations (Sarason, 1961; Sutter & Reid, 1969; Tomasini, 1973). In a study where the stress was created using the threat of electric shock, Dunn (1968) found the same patterns described in the three previous studies. The theory, however, would predict

that since the shock is a physical stressor, it should not differentially affect low and high A-Trait individuals. Heinrich and Spielberger (1982) suggested that the shock was interpreted as failure, since it was associated with incorrect responses, and therefore represented an ego threat to the subjects. This discrepant finding demonstrates how the individual's appraisal of the threat in a situation may potentially influence anxiety levels.

The interaction of intelligence, anxiety and learning has also been examined. Denny (1966) divided a sample of college students into groups representing high and low levels of intelligence and A-Trait (trait anxiety) scores. On a concept formation task of moderate difficulty he found that high anxious, highly intelligent students performed better than low anxious, highly intelligent students. Conversely, as would be predicted by the State-Trait Anxiety Theory, high anxious students with low intelligence performed worse on the task than low anxious, low intelligence students. Similar findings were reported by Stevenson and Odom (1965) in their study of low and high anxious elementary school children. However, attempts to replicate the work of Denny have been unsuccessful (Fischer & Awrey, 1973; Mazzei & Goulet, 1969). It appears that there was a crucial difference among these studies in that the latter two involved situations in which the experimenter interacted with the students on a one-to-one basis, which may have modified

appraisals of threat and subsequent anxiety and performance levels. It appears that the context can be very powerful in influencing the effects of anxiety on learning.

Anxiety in medical studies. Most studies of anxiety in the medical literature have focused on the effects of anxiety on short and long term outcomes, and the patterns in the level of anxiety from before hospitalization to the period after discharge. Johnson, Leventhal and Dabbs (1971) divided 62 surgical patients into 3 groups based on preoperative assessment of anxiety using the MAACL and a scale of worry. They found that higher anxiety and worry were related to more postoperative depression, fear and pain, but not to length of hospital stay or analgesics used. Cohen and Lazarus (1973) found that subjects higher on self-rated anxiety tended to have significantly higher levels of postoperative adverse psychological reactions. In an analysis of state anxiety measured with Spielberger's STAI, Johnston and Carpenter (1980) reported that higher state anxiety scores were correlated with more disturbed mood after surgery, but were not related to any of the other recovery variables studied. In a study of surgical patients Auerbach (1973) found that higher state anxiety on the Spielberger STAI was related to poorer hospital adjustment and more postoperative displeasure. Boyd, Yeager and McMillan (1973) found that patients undergoing vascular surgery for occlusive disease who had higher levels of anxiety before surgery (based on Rorschach

results) took significantly longer to return to an active lifestyle after their surgeries. In study of open-heart surgery patients, Kornfeld, Heller, Frank and Moskowitz (1974) found no relationship between a process measure of anxiety and postcardiotomy delirium (a common negative outcome of open-heart surgery). In other studies of postcardiotomy delirium in which level of fear was measured, Layne and Yudofsky (1971) found that low fear patients had the greatest incidence of delirium, whereas Morse and Litin (1969) found this group to have the least.

High levels of anxiety have also been associated with more complicated hospital recovery for heart attack patients (Pancheri, Bellaterra, Matteoli, Cristofari, Polizzi & Puletti, 1978). In studies relating anxiety level to more long term recovery outcomes, high anxiety has been associated with negative psychological and social adjustment in heart attack patients during rehabilitation (Hinohara, 1970; Wrzesniewski, 1976/77). A recent study on patients undergoing coronary artery bypass surgery reported that patients who were high on fear and anxiety preoperatively were more likely to show fear, anger and depression two months after hospital discharge, but were also more likely to have made major life-styles changes by the sixth month after surgery (Avis, 1984). These findings suggest that anxiety is differentially related to outcome, and relationships may be influenced by the particular measure used for anxiety (struc-

tured questionnaire versus unstructured self-reports) and the type of recovery outcomes (psychologcial versus physiological, short versus long term) considered (Cohen & Lazarus, 1979; Ray & Fitzgibbon, 1981). Since the only consistent relationship reported has been between anxiety and psychological indexes of recovery, it could be the case that anxiety does not exert a direct influence on the recovery process, but that the psychological responses seen both before and after this stressful happening are manifestations of a particular way an individual copes with stressful events.

Fewer studies in the medical literature have focused on the effect of anxiety on learning, the effect of learning on anxiety, or the interaction of anxiety and learning. The following sections present three studies which have examined the effects of anxiety on learning, five which have reported on the effects of information on anxiety levels, and one study which related interactions of fear and information level to recovery outcomes.

Anxiety and information recall. Studies of information recalled by medical patients have reported that patients typically remember about 46 to 63% of what is conveyed to them by health care professionals (Ley, 1979). Intelligence has been one of the least powerful predictors of recall, while mixed results have been found for age, with some studies reporting a negative relationship between age and amount of

information recalled (Joyce, Caple, Mason, Reynolds & Matthews, 1969; Ley, Whitworth, Skilbeck, Woodward, Pinsent, Pike, Clarkson, & Clark, 1976), while others have reported positive or no relationships (Ley & Spelman, 1965, 1967). One of the most consistent predictors has been level of prior medical knowledge (Ley, 1979). In one study of information recall in general medical patients, Ley and Spelman (1965) reported finding a curvilinear relationship between anxiety and information recall. They measured anxiety using the anxiety factor from the 16PF scale. Their results suggest that moderately anxious patients recall more than either the high or low anxious groups, a curvilinear relationship similar to that found by Tecce (1965). Reading (1981) studied the amount of information recalled by patients undergoing minor gynecological surgery. The researcher rated patients on level of worry, intelligence and measured anxiety level using the Spielberger STAI. Patients were given information in a structured interview and recall was measured both 30 minutes and three hours after the instruction session. Results indicated that patients remembered less in the recall assessment done at three hours compared to the one done at 30 minutes, but anxiety and intelligence were not related to variance in the recall scores. The author did not relate worry level to recall outcome, nor did he study the interaction of anxiety and intelligence, which might be expected to have an effect based on predictions from Spielberger's State-Trait Anxiety Theory.

Anxiety and preparation techniques. A number of investi-
gators have explored the effect of various information and
cognitive preparation techniques in reducing anxiety levels
in patients, which has been hypothesized to result in better
medical outcomes (Johnson & Leventhal, 1974). In a study of
patients undergoing dental surgery, Auerbach & Kendall
(1978) used 4 items from the STAI to measure anxiety before
and after an information session, and during the procedure.
They also prepared patients for the procedure by giving them
either specific information about the procedure, or general
dental information. They found that state anxiety tended to
increase in females and decrease in males after the educa-
tional session, regardless of the type of information. Fe-
males tended to have poorer adjustment to the procedure
which was not influenced by the type of information condi-
tion.

Wilson (1981) studied 70 patients (63 women and 7 men)
undergoing either cholecystectomy or abdominal hysterectomy
procedures. The patients were randomly assigned to one of 4
information groups. One group served as the control, re-
ceiving standard hospital preparation, the "information"
group heard a tape about the procedure and sensations they
might expect, the "relaxation" group received training in
using relaxation techniques, and the "combination" group re-
ceived both the information and relaxation interventions.
Preoperative fear was measured using patient responses to

three questions about their level of worry. Results indi-
cated that patients in the three intervention groups were
discharged significantly quicker than the control group.
Patients with high preoperative fear had poorer recovery
than low fear patients based on a recovery index composed of
multiple indicators. The relaxation and combination groups
did significantly better than the information only and con-
trol groups on the total recovery index and used less pain
medication. Within the fear groupings, patients with low
fear who got relaxation training were discharged quicker
than low fear patients who did not have the training. There
were no corresponding differences in the high fear patients.
The author speculated that for the high fear patients, there
was inadequate time for them to take full advantage of the
training, since other ratings indicated that they were ex-
tremely satisfied with the materials and information given
to them. Unfortunately, the author did not measure fear or
anxiety after the training sessions or postoperatively,
which may have demonstrated other relationships between in-
formation and anxiety.

Hartfield, Cason and Cason (1982) examined levels of
trait and state anxiety before and after a barium enema pro-
cedure to determine the relationship of these factors to the
type of preparation used and to the congruence between pa-
tients' expectations about the procedure and what they actu-
ally experienced. Other studies had demonstrated that trait

anxiety does tend to remain constant in threat situtions while state anxiety varies (Auerbach, 1973). In addition, male patients with higher trait anxiety were found to have higher state anxiety at the time of surgery (Spielberger, Auerbach, Wadsworth, Dunn & Taulbec, 1973), although another study using all females did not demonstrate elevated state anxiety with high levels of trait anxiety (Margolit, Teichman & Levitt, 1980), suggesting that the effect of anxiety is mediated by the sex of the patient. Hartfield and associates (1982) randomly assigned 20 patients (13 females and 7 males) into either a procedural information or a sensation information condition. Anxiety was measured before the intervention and immediately following the medical procedure using the Spielberger STAI. Patients also completed an inventory of expected sensations. Trait anxiety did remain constant for both intervention groups before and after the procedure. In their analyses, the researchers used trait anxiety as a covariate and examined the state anxiety in the two information groups. They found that subjects who received the procedural information were significantly more anxious than the sensation information group. In addition, the procedural information group had a significant discrepancy between their list of expected sensations before the procedure and what they indicated they actually experienced. Using other analyses, the researchers demonstrated that there was a very substantial correlation between congruence

of expected versus experienced sensations and state anxiety, with high congruence (experience matching expectation) negatively correlated with anxiety. This supports the notion that information leads to lower anxiety by acting on the expectations of the patient.

Ridgeway and Matthews (1982) studied the effect of different kinds of preparation on information level, anxiety and recovery outcomes in 70 women having hysterectomies. The three preparation groups included a cognitive training group, a specific information group (information about the hysterectomy), and a general information group (information about the hospital). Ten of the seventy women agreed to be in the study but refused to be in an information group, and so they made up a nonrandom control group. The other 60 were randomly assigned into one of the three preparation conditions. Ratings were made of anxiety (a 1 to 4 point scale) and worry (yes/no). The POMS (Profile of Mood States – McNair, Lorr & Droppleman, 1971) was completed at 4 time points in the study: before the intervention, after the intervention but before surgery, 3 days after surgery, and 3 weeks after discharge from the hospital. They found trends toward lower anxiety on the presurgical assessment for the cognitive and specific information group as compared to the control groups. The specific information group also knew more information before the procedure than any of the other groups. On recovery measures, the cognitive group needed

fewer oral and injectable analgesics, while the patients who had refused information took significantly more pain medication than the other groups. The groups did not differ in length of hospitalization. On post discharge measures, the only trend which emerged was that patients from the cognitive group complained of fewer symptoms than the other groups. The POMS was not different between the groups at any of the four testing points. The researchers did not compare levels of anxiety with levels of information to determine if there were relationships to psychological status or recovery outcomes. It is interesting to note that the patients who refused information had the lowest scores on level of information, and yet they reported that they understood the procedure as well as patients in the other information conditions.

Kendall, Williams, Pechacek, Graham, Shisslak & Herzoff (1979) studied the effects of preparation on anxiety in patients having cardiac catheterization. The 44 patients (two-thirds of whom had previous catheterizations) were assigned to one of four treatment conditions: a cognitive-behavioral group (which included rehearsal techniques), a patient education group (specific to the catheterization), an attention placebo control (visited by a therapist who listened to the patient but offered no information), and a control group which received the standard hospital procedure. The researchers used an abbreviated version of the state

portion of the Spielberger STAI, which was administered at three points in time: before the intervention (T1), after the intervention but before the procedure (T2), and again after the procedure (T3). At the first test point, patients were asked to rate their level of worry on a 4-point scale. On the day of the catheterization, the cardiologist and staff (who were blind to patients' intervention group assigment) rated the level of fear and cooperation of each patient. When the patients completed the STAI after the procedure (T3), they were instructed to respond as to how they felt during the procedure. Analyses indicated that, as expected, the ratings of the staff on adjustment to the procedure were negatively correlated with patients reported state anxiety during the procedure. Physicians' ratings of adjustment demonstrated that they rated the patient education group as significantly better adjusted during the procedure than the two control groups, and the cognitive-behavioral group was rated as significantly better adjusted than all other groups. The initial level of state anxiety (T1) was significantly correlated with levels of worry. In an analysis of covariance using the initial anxiety state as a covariate, the researchers found significant differences between the groups on anxiety state measured immediately before the procedure (T2). The educational and cognitive-behavioral groups did not differ from each other, but both had significantly lower anxiety scores than the control

groups. The pattern was similar for the post-procedure state anxiety measure (T3), although the level for the education group, which had been lower than that of the cognitive-behavioral group before catheterization, rose to a level above (although not significantly different than) the cognitive behavioral group. Analyses across time periods revealed that the cognitive-behavioral group was the only group which demonstrated significant reductions in anxiety level from both periods T1 to T2, and periods T1 to T3. This study and the others presented in this section indicate that anxiety can be influenced by interventions, especially those which contain a behavioral as well as an information component.

The last study considered here is one that has already been discussed in some detail (Sime, 1976). In this study of women having abdominal surgery, Sime divided patients by level of fear (high, medium, and low) and by level of information (high and low). In the analysis of the fear by information interaction, the researcher found that high fear subjects who had low information had the poorest post operative course, used more analgesics and sedatives, and spent significantly more days in the hospital than high fear subjects with high amounts of information. Sime also found that subjects with moderate levels of fear who had a high level of information had longer hospitalizations than moderate fear subjects who had low levels of information. These

findings suggest that the interaction between anxiety, fear or worry and information level is important to consider and may be related to a variety of outcomes.

Health Locus of Control and Learning

The concept of locus of control originated with the work of Rotter (Rotter, 1966) and describes the degree to which individuals believe or expect that their behavior is the result of (or reinforced by) factors within their control, or if it is the result of chance, luck or powers over which they have little control. The original Internal-External Locus of Control scale that was developed by Rotter (the Rotter I-E scale) has been used extensively in research to predict various behaviors. The I-E scale includes general expectancies which are not specific to any particular categories of experience. Research has demonstrated that prediction of behavior may be enhanced if expectancies which are germane to a specific set of circumstances are considered, rather than the general expectancies of the type used to construct the I-E scale. This logic led to the development of the Health Locus of Control scale (HLC) during the mid 1970's (Wallston, Wallston, Kaplan & Maides, 1976), which focuses specifically on beliefs people have about the factors which control their health. Individuals with high scores on the 11-item HLC scale are called "health externals," and are assumed to have beliefs that factors over

which they have little control determine their health. In-
dividuals who score at the other end of this unidimensional
scale are called "health internals" and are presumed to be-
lieve that they have control over factors which influence
their health. The HLC has been related to knowlege about
health, the likelihood of engaging in illness prevention be-
haviors, staying in treatment programs, and compliance with
treatment recommendations (see Strickland, 1978 for a review
of some of the early research on these issues). Although
early findings were encouraging, refinement of the HLC was
undertaken because research by Levenson (1974) demonstrated
that there were at least three independent dimensions in the
original Rotter I-E scale. Wallston, Wallston and DeVellis
(1978) constructed health related items which corresponded
to the internal, powerful others and chance dimensions found
by Levenson (1974) and constructed a new measure of locus of
control for health situations. This new scale, the Multidi-
mensional Health Locus of Control (MHLC) scale, consists of
three subscales which describe independent dimensions of
health beliefs. The Internality HLC (IHLC) subscale meas-
ures the extent to which people believe that their health is
internally or externally controlled. The Powerful Others
HLC (PHLC) subscale measures the extent to which people be-
lieve that powerful others exercise control over their
health. The third subscale, the Chance HLC (CHLC), measures
beliefs about the importance of chance in determining health

issues. Two alternate forms were developed for the subscales, each containing 6 items in Likert-type format. Although research has substantiated the statistical and conceptual validity of these three dimensions (Boyle & Harrison, 1981; Hartke & Kunce, 1982; Russell & Ludenia, 1983), the results of recent studies using the Multidimensional Health Locus of Control have been mixed (Wallston & Wallston, 1982). Part of this inconsistency may be due to the effect of situational characteristics on the stability of control beliefs (Lau, 1982), or the values or broader belief systems of the individual which may modify the relationship between control beliefs and actual behaviors and outcomes (Averill, 1973; Lowery, 1982). The major studies which have related the HLC and MHLC scales to information acquisition, knowledge seeking, and likelihood of patients complying with treatment recommendations will be reviewed in the following sections.

Health locus of control and health behaviors. Germer and Price (1981) measured HLC in people who were participating in a health fair. They speculated that these individuals, compared to a control group, were more likely to be health internals because their participation in the health fair indicated a desire to seek health-related information. The control group was selected by questioning people in the vicinity of the health fair who chose not to enter the health fair exhibit. The researchers found no difference between

the participants and the control group. They did find, how-
ever, that health fair visitors with a high school education
or less scored significantly higher on the powerful others
and chance scales than participants with more education,
suggesting that locus of control is modified by educational
level. Wallston, Maides and Wallston (1976) studied control
beliefs in college students instructed to imagine that they
were diagnosed as being hypertensive. They utilized the HLC
scale and found that students who valued health highly and
who were classified as internals were more likely to express
a willingness to seek out more hypertension information than
HLC external subjects. Unfortunately, this study did not
involve actual patients, nor did it include an actual meas-
ure of information seeking. Using the MHLC, Wallston and
Wallston (1981) found that students (again playing the role
of newly diagnosed hypertensive patient) who were more in-
ternal and who felt that powerful others could control their
health, but felt that chance had little to do with their
health typically asked more questions about their condition.
However, only high PHLC and low CHLC subjects chose more hy-
pertensive pamphlets, suggesting that the internality dimen-
sion is not necessarily related to self-directed information
seeking behaviors.

In a study of non-college individuals who were partic-
ipating in a public screening for hypertension, researchers
found that health internals (classified using the HLC) chose

significantly more hypertension pamphlets than the health externals (Toner & Manuck, 1979). However, this result was only true for patients in the older half of the sample, suggesting that general health attitudes and values may have been different in the older subjects, which led them to be more concerned about health and to seek more information about health-related issues. Krantz, Baum and Wideman (1980) measured locus of control using the HLC in college students and recorded the number of questions students asked during a physical exam with a university health center nurse. They found that health internals asked slightly fewer questions than health externals. When they divided the scale into 3 groups representing internals, a middle group, and externals, they found that the middle group asked significantly fewer questions than either the internals or externals. Sproules (1977) found that HLC internals tended to know more about their illness and were more likely to attend patient education sessions than HLC health externals. This finding was true for all age groups. In a survey of epilepsy patients using the MHLC, DeVellis, DeVellis, Wallston and Wallston (1980) found that individuals with high PHLC scores reported more willingness to expose themselves to information about the disease than subjects with low PHLC scores. Although it is difficult to compare these studies because only one utilized the MHLC which includes the three subscales, it does appear that two groups, health internals and

those who believe that powerful others exercise control over their health, tend to seek more information about health-related issues. In addition, findings seem to be more consistent in subjects who have an actual disease. Possibly the reality of having a health problem makes health a more salient issue around which these individuals have stronger beliefs and expectancies.

Health locus of control and compliance. Several studies have related health locus of control to compliance with treatment recommendations and continuation in treatment programs. Dishman, Ickes and Morgan (1980) found that individuals who tended to stay in exercise programs longer tended to be health internals rather health externals. Kincey (1981) found no difference in HLC status in women who completed an eight week weight reduction program. The researcher did find, however, that health internals did lose significantly more weight than health externals during the second five weeks of the program. Similar results were reported by Chavez and Michales (1980). Using the MHLC to measure locus of control in 121 employees participating in a corporate physical fitness program, O'Connell and Price (1982) found that individuals who remained in the program tended to be health internals. Lewis, Morisky and Flynn (1978) studied compliance behaviors in a group of predominantly black hypertensive female patients. Patients completed the HLC, and measures of health value and the amount

of assistance they typically get at home in complying with their medical regimen. The researchers found a significant interaction between the HLC and home assistance measures, with more internally oriented women who perceived that they had a higher level of home assistance reporting the highest levels of compliance behavior. Hallal (1982) studied the effect of locus of control on women performing self breast exams. The researcher found that the women who performed breast exams more frequently were those who tended to have higher levels of self-esteem, believed in the benefit of the health behavior, and were less reliant on powerful others. These studies suggest that internally oriented individuals are more likely to perform health-related behaviors. Although it is not clear, it appears that in situations where the behavior is linked to a treatment that is more highly regulated by the health care system (as in the case of the hypertensive patients), belief in powerful others tends to be related to compliance. In situations where the behavior is not as highly regulated (as in the case of the self-breast examination), less dependence on powerful others is associated with higher compliance rates.

Health locus of control and medical outcomes. A number of researchers have examined the interaction of preparation techniques and perceived control on specific outcomes in medical procedures. In a study referred to earlier, Cromwell and associates (1977) used the original I-E scale of

Rotter and found that nearly all of the externally oriented heart attack patients who were encouraged to take an active role in their treatment and internal patients who were prevented from taking an active role returned to the hospital or died during the 12 weeks following discharge from the hospital. They speculated that there was an incongruence between control beliefs and control conditions for these patients which led to these negative outcomes. In a study of dental patients, George, Scott, Turner and Gregg (1980) found that internally oriented subjects on the HLC showed the slowest rate of healing. In another previously cited study, Auerbach and associates (1976) found no relationship between the I-E locus of control measure and reported anxiety in patients about to undergo dental surgery. However, they did find that the patients whom dentists rated as better adjusted after the procedure were externally oriented patients who received general information and internally oriented patients who received specific information. The authors speculated that the specific information given to internal patients provided them with input that reinforced their desire to have control in the situation. General information reinforced ambiguity and lack of control in the situation for internally oriented subjects and contributed to their poorer outcomes. Conversely, the general instruction given to external patients allowed them to avoid any personal responsibility, a situation compatible with their

control orientation. Other researchers have found that providing information proved to be harmful, especially in situations where pain is the outcome, if patients are not also given a means to cope with what the information says they are likely to experience (Clum, Scott & Burnside, 1979; Langer, Janis & Wolfer, 1975). These studies suggest that the match of health locus of control and information level may be an important interaction to consider, producing results which may be similar to those in research which has examined combinations of repressive style with information level.

Two studies examined the effect of beliefs about control on anxiety before and after surgery. In a study of 109 patients about to undergo one of a variety of surgeries, Friedlander, Steinhart, Daly and Snyder (1982) found that high levels of presurgical anxiety were associated with patients who had strong beliefs in control of powerful others and chance over events in their lives. It should be noted, however, that the measure of control was the non-health multidimensional locus of control constructed by Levenson. In another study in which control was measured using patients' perceptions of control over their heart disease, Avis (1984) found that bypass patients who felt that their heart disease was caused by controllable factors spent less time in the hospital, but showed more anxiety, depression and fear following their surgery. However, control was inferred from interview responses and not taken directly from measures such as the HLC or MHLC.

The studies reviewed here suggest that health locus of control is a potentially important concept to consider in relation to information and psychological, medical and rehabilitation outcomes. Findings indicate that locus of control can influence information acquisition, and can interact with other factors to affect outcome. It appears that individuals with a strong belief in powerful others are more likely to consistently seek information, and internally oriented individuals will do the same in situations where there is high value placed on the information and its relationship to their condition. Findings suggest that individuals who have a strong belief in chance are less likely to pursue information, be less affected by information presented to them, but are more likely to have more negative psychological outcomes, such as greater levels of anxiety. Wallston and Wallston (1982) have suggested that examination of combinations of high and low levels of the three MHLC scales may lead to significant findings. For example, they have suggested that an individual who is high on the internal scale, believes in powerful others, but does not place much belief in chance may possess the constellation of beliefs which is most adaptive in the health care system. They have labelled these individuals as a "believers in control" because they feel that their health is controllable either by themselves or by others, but is not a matter of chance or fate. Beliefs about control appear to be more stable in in-

dividuals who are dealing with a chronic illness situation, which may tend to heighten the importance of health-related values. Considering the differences that emerge when beliefs about powerful others are separated from the internality dimension, it appears that the MHLC may provide a better measure to predict behavior and outcome compared to the HLC.

Social Support and Outcome

Interest in the relationship of support systems to individual functioning has led to a number of research efforts spanning the disciplines of sociology, epidemiology, psychology and medicine. In broad terms, social support as defined by Caplan, Robinson, French, Caldwell and Shinn (1976) is "any input directly provided by another person (or group) which moves the receiving person towards goals toward which the receiver desires" (p. 39). It can also be viewed as an expression of the degree to which basic social needs are gratified through social interaction and relationships. A number of researchers have speculated that support systems play a major role in maintaining the integrity of the psychological and physical well-being of the individual (Caplan, 1974; Cassel, 1976). In discussing the conceptualization of social support, Norbeck, Lindsey & Carrieri (1981) refer to Kahn's description of social support as the interpersonal transactions containing at least one of three dimensions: 1) positive affect expressed from one to another; 2) endorse-

ment of the other person's actions or views; and 3) giving someone aid, either symbolic or material (Kahn, 1979). This description corresponds to another distinction often made in the social support literature between instrumental and expressive support, where instrumental support refers to concrete aid (e.g., money), whereas expressive support denotes the use of emotional encouragement (Dean & Lin, 1977). Other researchers have stressed the importance of the individual's appraisal of support, conceptualizing perceived social support as having three dimensions: emotional, tangible and informational (Schaefer, Coyne, & Lazarus, 1981).

The terms "social support" and "social networks" have emerged as key concepts in this literature. The term social network has been used to refer to the direct and indirect connections linking individuals (Pilisuk & Froland, 1978). Social networks have been conceptualized as the structural framework within which support may or may not be available to the individual. A number of structural characteristics of social networks have been identified, among them the size of the network, the number of links between network members (density), the similarity of network members (homogeneity), and the formation of distinct groupings (clusters) within the network (Mitchell & Trickett, 1980; Pilisuk & Froland, 1978). Several qualitative characteristics have also been used to describe networks, such as intensity of the ties, their durability, multiplexity (diversity of types of ex-

changes which occur), reciprocity of exchanges, and frequency of contact. Although social support and social networks are conceptually distinct, these concepts are sometimes operationalized and measured in ways which overlap (Norbeck et al., 1981).

Measures of social support and social networks. A number of approaches have been used to measure social support and social networks. In some cases, information about these concepts has been extrapolated from instruments originally designed to measure other constructs which are assumed to be related to social support and social networks (e.g., Nuckolls, Cassel & Kaplan 1972 study using psychosocial assets). The difficulty with this approach is that these measures may be tapping other dimensions in addition to support, such as ego strength, adaptability or community adjustment, which contaminate the measure and make it difficult to draw valid conclusions from the data (Mansbach, Weisman & Trickett, 1984). More specific measures have been developed, emphasizing different aspects of either support or networks, or characteristics of both. For example, the Dimensions of Social Support Scale of Cohen and Lazarus (1977) focuses on the qualities of support and includes questions about the qualities of relationships the focal individual has with spouse, friends, work associates, relatives and neighbors. The scale is composed of three dimensions mentioned previously: tangible support, emotional

support and informational support. Other scales have focused primarily on analysis of social network dimensions (e.g., The Pattison Psychosocial Kinship Inventory of Pattison, Llamas & Hurd, 1979). Some instruments have been developed which assess certain dimensions related to both the quality of support and characteristics of the support network, such as the Social Relationship Scale of McFarlane, Norman, Streiner, Roy & Scott (1980) and the Norbeck Social Support Questionnaire (NSSQ) published by Norbeck, Lindsey and Carrieri in 1981. The NSSQ was chosen for the current study because it measures dimensions of both social support and social networks, and produces quantitative scores which increase the power of data analyses. This instrument yields three major variables: 1) a total functioning score, focusing on the social support dimensions of affect, aid and affirmation, 2) a total network score, assessing the size, stability and availability of relationships in the network, and 3) a total loss score, indicating whether a person lost a relationship from the network and the perceived impact of that loss.

Social support and health. Social support and social network characteristics have been related to a number of psychological and physical health outcomes. Social support is generally viewed as a factor which has a positive effect on these outcomes, although the mechanism by which this occurs is not well understood. Some researchers have specu-

lated that social support has a direct effect on health by increasing the individual's resistance to disease (Hamburg & Kilillea, 1979), while others have suggested that social support acts as a moderator by increasing one's ability to cope with life, thereby reducing the deleterious effects of stress (Cobb, 1976). There are others who argue that low social support is a stressor itself and is not a moderator of stress (Andrews, Tennant, Hewson & Vaillant, 1978; Gore, 1978). Some of the research on which these hypotheses are based, however, may have serious flaws. Thoits (1982) contends that there is an inevitable confounding in the measurement of social support and stressors because many stresses of life are inherently meshed with disruption of social contact and loss. Some of the discrepancies in the social support literature may also be due to the type of designs used in various studies (retrospective versus prospective), whether prior symptoms are controlled for, and whether interactions between social support measures and other variables are taken into account (Monroe, 1983). With these limitations in mind, a review of the major studies which have related social support and social networks to physical illness, information acquisition, and rehabilitation issues in cardiac patients will be presented in the following sections. Although an extensive literature exists relating social support and social networks to mental disorders (see Greenblatt, Becerra & Serafetinides, 1982, and Mitchell &

Trickett, 1980, for reviews), this research will not be re-
viewed so that the focus on information and cardiac patients
can be maintained.

Social support and general health. In a study of 2229 men
and 2496 women who were part of a random sample of the 1965
Human Population Laboratory survey of Alameda County resi-
dents, Berkman and Syme (1979) found that individuals who
lacked social and community ties had a higher rate of mor-
tality during the period between 1965 and 1976. They meas-
ured social network using the Social Network Index which was
used to code data from the intial surveys. The researchers
also examined the effect that initial health status, socioe-
conomic status, health practices and utilization of health
services might have had on the relationship between social
isolation and mortality. None of these factors contributed
to the relationship. Nuckolls and associates (1972) studied
the relationship between life changes, psychosocial assests
and pregnacy and birth complications. They found no direct
relationship between the variables, but did find that women
with low psychosocial assests and high life stress both be-
fore and after delivery had three times the number of com-
plications as women with high life stress and high psychoso-
cial assets. To the extent that psychosocial assets can be
equated with social support (which may be limited because of
other psychosocial dimensions included in this measure),
this study suggests that social support can be protective
against high levels of stress.

In her study of gallbladder patients, Hitchcock (1982) found that patients with low levels of social support had poorer recoveries compared to patients with higher levels of support. In a study of asthmatic patients, deAraujo, Van Arsdel, Holmes and Dudley (1973) measured social support using the Berle Index of Social Characteristics (another measure which mixes support with other dimensions). They examined the relationship between stress, social support and severity of asthma symptoms as measured by the dosage of daily drugs necessary to control the symptoms. They found that the group with high levels of stress and low social support had the most symptoms. Burke and Weir (1977) found that spouses who were more satisfied with the help they received from their partner, and with their lives and jobs, reported fewer physical symptoms. However, Schaefer and associates (1981) found no relationship between social support and physical health in their research. Gore (1978) examined 100 men who were about to lose their jobs due to the shutdown of a factory. The researcher interviewed the subjects five times over the two year period which began shortly before their termination. The researchers measured social support using their own 13-item instrument, and recorded a number of physiological outcomes, including cholesterol and uric acid levels. They found that individuals with high and low social support did not differ in number of weeks unemployed or amount of economic deprivation. However, the low

social support group had levels of cholesterol and uric acid which were higher than those of the high social support subjects during the inital phase of unemployment. In addition, for individuals sufffering from arthritis, the number of swollen joints increased dramatically as the level of social support decreased. Since it is beyond the scope of this review to consider the numerous other studies relating social support, social networks, and physical health, the reader is referred to comprehensive reviews of the topic (Suls, 1982; Wallston, Alagna, DeVellis & DeVellis, 1983).

Social support and learning. A few studies have focused on the relationship between social support and learning. Sarason (1981) reported on three experiments which examined the relationship between test anxiety, stress, and social support. The researcher hypothesized that social support would reduce test anxiety, leading to better performance on intellectual tasks, especially in highly anxious subjects. Social support was operationalized in two different ways: in one experiment, it was defined as the opportunity available for the individual to associate with peers before the experiment, and in the other experiments, it was defined as contact with an experimenter who showed empathy and acceptance of the subject. In the first study, the researcher found that college students in the support condition did perform better than subjects in a control condition, with a significant interaction between support and anxiety. Further anal-

yses of this interaction revealed that the significance came exclusively from the group of subjects with high anxiety who were in the supportive condition. In the second experiment, social support was given to subjects by providing a situation in which a confederate disrupted the task performance by indicating it was too hard, which resulted in a discussion between subjects and experimenter about dealing with difficult tasks. Again, analyses indicated that support was beneficial for highly anxious subjects, even under conditions in which achievement-oriented instructions were given. The third experiment included a measure of cognitive interference, which has been associated with poorer performance in highly anxious subjects in evaluative performance situations. Similar findings emerged in this study, demonstrating that highly anxious subjects in the support condition performed better, and were less preoccupied with disruptive thoughts than subjects in the control condition. Two other studies have examined the effects of social support and information on outcome. Egbert, Battit, Welch and Bartlett (1964) studied the effect of support provided by anesthetists on outcomes in patients undergoing surgery. They found that patients who received specialized information and support in the form of encouragement needed less medication following surgery, were rated as more emotionally and physically comfortable, and were discharged from the hospital significantly earlier than a control group. In this study,

the surgeons in charge of the patients were blind to the treatment assignment of subjects. Caplan and associates (1976) investigated interventions designed to increase adherence to treatment regimens in a group of hypertensive patients. The study included three groups: a control group receiving normal care by a physician; an information group receiving four weekly lectures on hypertension and its treatment; and a social support treatment group getting the same education as the information group, but in addition, participating in role playing sessions and group discussions with a "buddy." Although there was no difference between the groups in blood pressure tests 8 weeks later, the information and social support groups both showed gains in information, higher motivation to adhere, and greater self-reported adherence than the control group. However, there were no differences between the two treatment groups. It is possible that the information group may have included aspects of support which may have made it more similar to the support group. In addition, the effects of support may be such that they do not appear immediately, but manifest themselves over longer periods of time during which compliance becomes a more crucial issue. Other findings suggest that social support may affect adherence both directly through encouragement and indirectly by influencing the belief and value system of the individual supported (Langlie, 1977). Other research supporting this hypothesis includes

two studies by Janis and Hoffman (1970, 1982) in which they found that smokers attending an anti-smoking clinic who participated in a buddy system were more likely to abstain from cigarette smoking during the 10 years after the intervention. They suggested that support assisted the smoker in internalizing the values of the smoking program, leading to sustained abstinence from cigarettes.

Social support and cardiac patients. Six studies have examined the effect of social support on outcomes in heart attack and heart failure patients. In a study of the families of 76 patients who had experienced myocardial infarction, Finlayson (1976) found that men who returned to work quicker and had a more positive outlook about their recovery had wives who reported receiving more social support from a variety of kin and non-kin sources. They also found that women who relied on immediate family for primary support had husbands who experienced poorer outcomes. Other studies have found that heart attack patients in home situations where the family expresses extreme worry about the patient and congestive heart failure patients in situations where the family is overprotective tend to either be not working or working fewer hours during the year after their hospitalization (Garrity, 1973; Lewis, 1966). These last results suggest that what is measured as "support" may not always result in beneficial outcomes. Two other studies of heart attack patients have not examined support from family and

friends, but have operationalized support as a benefit that comes directly from therapeutic interventions used by health care professionals with patients, and indirectly through therapy and self-help groups. Gruen (1975) found that heart attack patients randomly assigned to a treatment group where they received therapeutic sessions 5 times a week experienced fewer supraventricular arrythmias, decreased incidence of congestive heart failure, higher self-reported vigor, and fewer fears about returning to normal activity during the 4 months after discharge from the hospital. Rahe, Ward and Hayes (1979) followed 44 heart attack patients for four years to determine if patients participating in group therapy experienced better outcomes than those in a control group. Patients who received group therapy sessions had significantly fewer reinfarctions, deaths, and were more likely to return to full-time work and change coronary-prone behaviors such as overwork and time urgency. The researchers concluded that the supportive aspects of the group therapy accounted for these group differences. It is not clear from these studies, however, if the outcomes are due to the effects of social support, or if these effects are dependent on the fact that the health care professional is in the position of an "authority figure" and may influence outcomes through this dynamic rather than through social support. Siegrist, Dittmann, Rittner and Weber (1982) studied a group of heart attack patients and controls to determine if spe-

cific work stressors, lack of social support, and acute life changes were more prevalent in the lives of the MI patients. Two hundred and fifty-eight patients participating in a cardiac rehabilitation program were followed for 18 months after their hospitalization. Initial analyses had revealed that significantly more MI patients lacked socio-emotional support (measured by one interview question) before their heart attack as compared to control patients. They found that more patients died at the 18 month follow-up who reported high levels of three "risk factors" (occupational stress, numbers of stressful life events, and coronary-prone behaviors). Subjects who had less socio-emotional support reported significantly more cardiac complications.

These studies indicate that social support and social networks are important factors to consider in examining outcomes in cardiac patients. Unfortunately, most of the studies cited did not use adequately tested measures of social support, which makes it difficult to draw conclusions from this research. It appears that in learning situations, social support may interact with anxiety and improve intellectual performance. Social support and social networks may also have an impact on more long term outcomes such as experience of complications, improved social functioning, and higher rates of return to work in cardiac patients. The only study to date which has considered return to work in angioplasty patients reported that of the 1,150 patients who

would be expected to have the best chance of returning to work (those working part- or full-time before the procedure and 60 years of age or younger), patients with chest pain and those who were female had significantly decreased employment rates (Holmes et al., 1984). In addition, patients with successful procedures returned to work significantly quicker than patients who had surgery following an unsuccessful procedure. No social support support information was available for these patients, so it is impossible to determine how this might have related to the return to work measure. It should be noted that recent studies of the working status of bypass patients after surgery have suggested that other outcomes may be more meaningful than return to work, such as perceived work efficiency and satisfaction (Barnes, Ray, Oberman & Kouchoukos, 1977; LaMendola & Pellegrini, 1979). Social support and social networks may relate to these variables as well as to the conventional return to work measure.

Statement of the Problem

Three major points emerge from this review of the literature: 1) a number of psychosocial factors have been studied which influence information processing either positively or negatively; 2) studies with patients undergoing stressful medical procedures have demonstrated that the way in which patients are prepared can produce differential outcomes de-

pending on the psychological characteristics of the patient; and 3) none of the psychosocial or informational factors which have been found to influence short and long term outcomes in medical patients have been studied in patients undergoing P.T.C.A. It is important that these factors are examined in P.T.C.A. patients so that positive effects on outcome can be enhanced, and negative influences can be minimized. An understanding of these relationships could suggest specific psychological and educational interventions which might be used to improve psychological, functional and medical outcomes in this patient group.

Hypotheses

The hypotheses which follow are based on the findings of studies presented in the review of the literature and estimates of how the relationships studied in other situations might be altered by characteristics of the P.T.C.A. procedure. The hypotheses will be presented in five major categories: A) hypotheses related to informational outcomes; B) hypotheses related to the success of the procedure; C) hypotheses related to anxiety outcomes; D) hypotheses related to 6-month medical outcomes; and E) hypotheses related to 6-month functional outcomes. When these hypotheses are referred to in subsequent sections, they will be identified by the corresponding category letter and number (e.g., the second hypothesis relating factors to informational outcomes would be referred to as "Hypothesis A.2").

A. Hypotheses Related to Informational Outcomes

Controlling for the age and intelligence of patients:

1. Patients who are rated as vigilant will tend to have higher scores on the cardiac information pretest than patients who use avoidance: this measure will account for more variance than the dispositional coping measure or the other psychological variables.

2. Patients who use avoidance will tend to gain less information during hospitalization about coronary risk factors and procedural knowledge than patients who use vigilance: there also may be interactions between avoidance-vigilance, anxiety and sex.

3. Patients who are "true repressors" will not differ from sensitizers or "low anxious" patients on pretest information levels, but will tend to gain less information about the procedure and coronary risk factors during hospitalization. This dispositional measure will explain more variance than the episodic coping measure or other psychological measures; there may be interactions between dispositional coping, sex and anxiety related to information gain.

4. Both the episodic and dispositional measure of coping will be related to 6-month information scores, with "avoiders" and "true repressors," having lower scores on the cardiac risk factor knowledge test.

5. Patients with high levels of belief in powerful oth-
    ers, who are more internal, and believe less in
    chance will have higher pretest information scores
    than groups represented by other combinations of the
    MHLC scales.

6. Patients who have minimally functioning social sup-
    port systems, with fewer members and higher levels of
    loss, will tend to have lower scores on risk factor
    knowledge measured at 6 months after the procedure,
    as compared to patients with higher levels of social
    support and more extensive support networks.

B. Hypotheses Related to Success of the Procedure

1. Patients who are truly "low anxious" as measured by
    the Weinberger measure of repression-sensitization
    will tend to have the most successful angioplasty
    procedures: "true repressors" and avoiders will have
    less successful procedures than the truly low anx-
    ious, but will have more successful procedures than
    either the vigilant or sensitizing patients.

2. Patients with higher gains in knowledge about the
    procedure will tend to have more successful proce-
    dures.

3. Patients with high levels of belief in powerful oth-
    ers, who are internal and who have a low level of be-
    lief in chance as measured by the MHLC will tend to
    have more successful procedures.

C. Hypotheses Related to Anxiety Outcomes

Controlling for the pretest measure of anxiety and severity of illness:

1. Patients who are truly "low anxious" as measured by the Weinberger measure of repression-sensitization will tend to have the least anxiety the evening before the procedure: "true repressors" and avoiders will have more anxiety than the truly low anxious, but will have less than either the vigilant or sensitizing patients. Postprocedural and 6-month anxiety levels will follow the same trends, controlling for the success of the procedure.

2. Patients with higher gains in total knowledge will tend to have less anxiety the evening before and the day after the procedure, and at 6 months, controlling for success of the procedure.

3. Patients with high levels of belief in powerful others, who are internal and who have a low level of belief in chance as measured by the MHLC will tend to have less anxiety the evening before and the day after the procedure, and at 6 months, controlling for the success of the procedure.

4. Patients with poorer functioning, smaller social support systems will be more anxious the evening before and the day after the procedure, and at 6 months, controlling for success of the procedure.

D. Hypotheses Related to 6-month Medical Outcomes

Controlling for the age of the patient, the success of the procedure, severity of illness, and other medical factors:

1. Patients with a mismatch between coping style and information level will be more likely to have restenosis during the 6 months after the procedure, with the repressor-information mismatch more strongly related to outcome: this combination will explain more variance than the other psychosocial variables and may interact with baseline medical factors.

2. Patients with a mismatch between coping style and information level will be more likely to have more complications during the 6 months after the procedure, with the repressor-information mismatch more strongly related to outcome: this combination will explain more variance than the other psychosocial variables and may interact with baseline medical factors.

E. Hypotheses Related to 6-month Functional Outcomes

Controlling for success of the procedure and baseline medical factors (and baseline employment status for work outcomes):

1. Patients with coping style-information level mismatch are more likely to have greater psychological upset at 6 months, to have not returned to work, to be working less efficiently, and to have a lower overall

level of social functioning as compared to patients with a style-information match: the strongest relationship should be between sensitizer-information mismatch and outcome.

2. Patients who are more anxious during their hospitalization will tend to have poorer social functioning and work outcomes, and more psychological upset during the 6 months after their procedure: the coping style-information level match variable, however, will be more strongly related to outcomes than anxiety level during hospitalization.

3. Patients who are classified as externals, with less belief in powerful others and more belief in chance, will have more psychological upset at 6 months, and poorer work outcomes and social functioning than other groups based on MHLC combinations.

4. Patients who have minimally functioning social support systems, with fewer members and higher levels of loss, will tend to have poorer psychological status and social functioning, lower rates of return to work and work efficiency at 6 months after the procedure, compared with patients who have higher levels of social support and stronger support networks.

METHODS

Design

This study involved two major phases: 1) the measurement of psychosocial, medical and informational variables during hospitalization for P.T.C.A.; and 2) assessment of psychosocial, medical and rehabilitation outcomes six months after discharge from the hospital. All patients were given a standard educational session composed of a slide-tape presentation, a pamphlet, and consults from the Cardiovascular Clinical Nurse Specialist, medical staff from the P.T.C.A. team, and the surgeon and anesthesiologist standing by in the event that surgery was necessary. Figure 2 summarizes the major components at each stage along the timeline from hospital admission to six months after the procedure.

FIGURE 2

DIAGRAM OF THE STUDY TIMELINE

Patient admitted for P.T.C.A.	Evening before P.T.C.A.	P.T.C.A. performed	Prior to patient discharge	6 months after the procedure
*Informed consent secured	*Patient coping assessed via interview		*Patient given risk factor consultation	*Referring physician completes medical follow-up
*AKS Knowledge pretest given	*IQ test given		*Patient visited by dietary and rehabilitation specialists	*Patient completes 6 month survey including:
*AGT state anxiety measure given	*Patient given psychosocial inventory with measures of:		*AKS Knowledge posttest given	-AKS Knowledge measure
*Patient given slide-tape education	-Repression-sensitization		*AGT state anxiety measure given	-Social functioning
*Patient given instruction by P.T.C.A. nurse	-STAI anxiety			-Work status
*Patient visited by cardiologist, surgeon and anesthesiologist	-Locus of control			-AGT anxiety
	-Social Support			-POMS
				*Referring physician alerted that patient is in the study

Subjects

Patients who were approached to participate in this research were first-time P.T.C.A. patients who were referred to Seton Medical Center in Daly City, California, for coronary angioplasty. Subjects were successive admissions who came for treatment over a period of five months between January and May of 1984. Each potential participant was required to meet the following criteria: 1) a coronary artery occlusion which had been documented by angiographic study; 2) no prior attempted P.T.C.A. procedures; 3) ability to speak English; 4) age between 30 and 70 years; 5) willingness to sign informed consent to participate in the hospital and follow-up phases of the current research. One-hundred and nine patients met the 5 criteria and were approached to participate in this research. Three patients refused to participate, all stating that they felt too tired and would rather not participate in the project. Of the remaining 106 patients, 2 requested to be dropped from the study after they had given informed consent, had completed the pretest of information, and had been interviewed by the author. One of these had a successful procedure, and the other had cardiac bypass surgery after an unsuccessful P.T.C.A. attempt. The first patient gave no reason for dropping out, while the patient who had bypass surgery felt too depressed to continue in the study. Seven other patients who consented to be in the study and also completed the information pretest and were

interviewed had to be dropped from the study because P.T.C.A. was not attempted on them. This situation occurred because patients are accepted for referral based on the assessment by the cardiologists at Seton of angiographic and medical information sent by the referring physician. In the cases of these seven patients, it was not known until the arteries of the patients were visualized in the catheterization laboratory at Seton that there were anatomical difficulties or characteristics of the lesion which indicated that P.T.C.A was not an appropriate treatment for the patient. Because the procedure was not attempted for these individuals, they were eliminated from the study, resulting in a final sample of 97 patients.

Table 1 presents a description of the demographic characteristics of the final sample of 97 patients included in this research. The final sample was predominantly male, caucasian, approximately 57 years of age, mostly employed, with approximately 2 years of education beyond the high school level.

Table 2 presents the baseline medical characteristics of the final sample of 97 patients. Forty-four (45%) had a history of heart attack, 13 (13%) had previously had cardiac bypass surgery, 41 (42%) of the patients had disease in one vessel, and 56 (58%) had multivessel disease. Since seven patients did not complete the knowledge posttest before they were discharged from the hospital, all of the analyses using

TABLE 1

Patient Demographic Characteristics

VARIABLE	CATEGORIES	NUMBER	PERCENT
Sex	Male	83	86%
	Female	14	14%
Marital Status	Single	6	6%
	Married	79	82%
	Divorced	10	10%
	Widowed	2	2%
Ethnic Background	Asian	2	2%
	Black	3	3%
	Caucasian	81	84%
	Hispanic	2	2%
	Other	9	9%
Religious Preference	Protestant	26	27%
	Catholic	20	20%
	Jewish	11	11%
	Other	18	19%
	None	22	23%
Employment Status	Employed	68	70%
	Not Employed	29	30%
Age Categories	35 to 55	33	34%
	56 to 64	44	45%
	65 to 70	20	21%

N = 97
—

in-hospital knowledge as an outcome variable include the valid data available on the 90 patients who completed both a pre and post knowledge test. Six-month medical follow-up was received on every patient (100%). However, sufficient

information was not available to referring physicians on 22 (23%) of the patients, making it impossible to determine whether these individuals had experienced a restenosis. Six-month follow-ups were received from 78 (80%) of the 97 patients.

TABLE 2

Patient Baseline Medical Characteristics

VARIABLE	CATEGORIES	NUMBER	PERCENT
Predominant Symptoms	Chest Pain	90	93%
	Arrythmias	2	2%
	Assymptomatic	4	4%
	Fatigue	1	1%
Symptom Duration	No symptoms	1	1%
	> 1 year	15	16%
	6 to 12 months	10	10%
	3 to 6 months	24	25%
	1 to 3 months	27	28%
	< 1 month	20	20%
Angina Class	I	4	4%
	II	50	52%
	III	41	42%
	IV	2	2%
Obesity Status	Yes	32	33%
	No	65	67%
Heart Attack History	Yes	44	45%
	No	53	55%
Cardiac Bypass History	Yes	13	13%
	No	84	87%
Number of Occluded	Single Vessel	41	42%
	Multivessel	56	58%
	* 2 arteries	42	75%
	* 3 arteries	14	25%

N = 97

Measures

The sections which follow present the independent and depen-
dent variables and describe the measures used to operation-
alize these constructs in the current investigation.

Measures of the Independent Variables

Avoidance-Vigilance coping dimension. This dimension de-
scribes a continuum focusing on the degree to which people
avoid or are vigilant toward information. The instrument
used to measure avoidance-vigilance was an episodic measure
based on the work of Cohen and Lazarus (1973) and includes
15 questions which are asked in an interview format (see Ap-
pendix A). The 15 major questions comprising the final form
of the interview were composed of several parts, with spe-
cific probes which were asked to elicit any information not
volunteered by the patients. The interview was revised sev-
eral times in collaboration with Dr. Cohen until the wording
of each question seemed satisfactory.

A detailed coding manual was developed to score the
avoidance-vigilance level of each patient (see Appendix B).
This scoring scheme was also based on the work of Cohen and
Lazarus (1973) and developed in collaboration with Dr. Co-
hen. A major goal of this effort was to produce a quantita-
tive score which would be composed of individual ratings of
separate items. The final coding format included 24 items,
most of which had rating levels between 0 and 3. Each item

and level were described in detail in the scoring manual. The 24 items were designed to represent three major components of avoidance-vigilance: acknowledgement/avoidance of emotional content, information seeking, and information completeness and accuracy. These subfactors are those components that seemed evident from the descriptions of the coding scheme used by Cohen and Lazarus (1973). This structure guided the development of the final scoring items. The information seeking component was comprised of the first 6 coding items, while the last 10 items contributed to the information accuracy/completeness dimension. Acknowledgement/ avoidance of emotional content was composed of the middle 8 coding items. A coding sheet was developed to facilitate the scoring of patient interviews (See Appendix C).

The final score was not a simple addition of the rating assigned to each item. Because there were so many items associated with the information accuracy and completeness subscale, this dimension would have dominated the final score, which would have deemphasized the importance of the acknowledgement/avoidance of emotion component. This inequity led to the development of a weighted scoring scheme in which the raw score on items assessing acknowledgement/ avoidance of emotional content represented half of the final total score, and information seeking was doubled and combined with the raw score for information completeness and accuracy, which together comprised the other half of the fi-

nal total score (See the Introduction to Appendix B for more details). The total score ranged from 0 to 36 and was used in all of the major data analyses. In addition, because the two components of acknowledgement/avoidance of emotional content and information seeking represented two psychometric and theoretically discrete parts of this total score, they were entered as separate variables in selected data analyses to examine their unique contributions. The scores of these dimensions varied from 0 to 18. The author rated all of the patient interviews using the coding manual, and an independent rater also scored a random subset of the interviews to determine the reliability of the ratings.

Repression-sensitization coping dimension. This is a dimension which classifies people along a continuum, with the repressive end representing individuals who tend to repress the anxiety provoking elements of situations, while the other end of the continuum represents sensitizers, who intellectualize and are sensitized to the anxiety provoking elements of situations. In this study, repression-sensitization was assessed as a dispositional measure using the Weinberger and associates (1979) method of combining the Taylor Manifest Anxiety (TMAS) scale from the MMPI (Taylor, 1953) and the short form of the Marlowe-Crowne Social Desirability (MCSD) scale (Strahan & Gerbasi, 1972). Both scales are composed of 20 true-false statements, which were intermixed and given to patients as part of a question-

naire entitled "Patient Inventory." The scales were split at the mean, and patients who had scores below the mean on both scales were classified as "truly low anxious," those who scored low on the TMAS and high on the MCSD were termed "true repressors," patients who scored high on the TMAS and either low or high on the MCSD were classified as "sensitizers." The sensitizer group was not divided into the two groups used by Weinberger and associates (defensive high anxious and high anxious) because their study and others Asendorpf & Scherer, 1983; Shaw et al., in press) have demonstrated that these two groups tend to have similar performance outcomes. Since a number of studies have divided repression-sensitization scales to either eliminate patients with scores at the mean or used mean scores to form a middle group which does not demonstrate either style predominantly (Cohen & Lazarus, 1973; Lefcourt, 1966; Shipley et al., 1978, 1979), this researcher constructed another repression-sensitization variable to examine this middle group. To accomplish this, those patients with scores at the mean on the TMAS became the middle group. Thus, this 4-group measure of repression-sensitization included four groups: 1) the true repressors; 2) a middle group; 3) sensitizers; and 4) the truly low anxious. This measure of repression-sensitization was interchanged with the Weinberger and associates measure in the data analyses to examine any differences in their predictive value. Although adequate reliability and validi-

ty data are available for both the TMAS and the MCSD scales, no reliability data exist for the combination of these two scales in measuring repression-sensitization, and the Weinberger et al. (1979) and Shaw et al. (in press) studies provide some support for the predictive and concurrent validity of the measure.

Anxiety. The measure of anxiety used the evening before the procedure was the Spielberger State-Trait Anxiety Inventory (STAI), which is an assessment of both state and trait anxiety (Spielberger et al., 1983). The instrument consists of 40 items, 20 assessing state anxiety and 20 assessing trait anxiety. Reliability studies using the STAI have been reported using high school and college samples (Spielberger et al., 1983b). Test-retest reliability correlations for the trait anxiety scale in the college group ranged from 0.73 to 0.86 over a three month period, whereas the range for high school students was somewhat lower, ranging from 0.65 to 0.75. The median reliability for the state anxiety scale was 0.33. This low value was expected by the researchers, who hypothesized that state anxiety would be influenced by situational factors, causing it to fluctuate over short periods of time. The alpha coefficient for internal reliability was very high for both state (0.93) and trait (0.90) STAI scales, suggesting that both are internally consistent. Concurrent, convergent, divergent and construct validity of both STAI scales have been examined in

studies comparing the STAI to MMPI measures of anxiety, the Cornell Medical Index, and tests of academic achievement, and were all found to be adequate (Spielberger et al., 1983b).

In addition to the STAI, the Adjective Generation Technique (AGT) of Potkay and Allen (Allen & Potkay, 1983a) was given to patients at the pretest and posttest administrations of the Angioplasty Knowledge Survey, and at the 6-month follow-up. This is a measure of state anxiety and has been shown to have high correlations (0.80) with the STAI measure of state anxiety (Allen & Potkay, 1983a). The patient is given instructions to think of five adjectives which describe how he or she feels that day (see Appendix D). Patients are then given a score for each word which is based on normative research in which the anxiety content of each word was rated on a scale from 0 to 600. The score for each word is added, and the total is divided by the number of adjectives used, so that the final anxiety score represents an average of the adjectives generated. Extensive reliability and validity data are not available for the anxiety scoring of the AGT.

Multidimensional Health Locus of Control. Health locus of control is a measure of the extent to which individuals believe that events which influence their health are under their control, or are controlled by external forces. The measure used in this research, the Multidimensional Health

Locus of Control (MHLC) scale, is based on the work of Wallston, Wallston and DeVellis (1978) and contains three separate scales assessing beliefs about internality, power of others, and chance (IHLC, PHLC and the CHLC). The MHLC consists of 18 questions with responses arranged on a 6-point Likert scale and administered in pencil and paper format. The score for each scale is obtained by adding the response ratings for the six items associated with that scale. Form B of the MHLC was randomly chosen for use in this research, since both versions (Form A and From B) are highly correlated and represent essentially the same measure (Wallston et al., 1978). Wallston and associates (1978) reported alpha reliability coefficients of between 0.83 and 0.86 for items in both forms combined. Alpha reliability for the three individual scales (IHLC, MHLC and PHLC ranged from 0.67 to 0.77. Factor analyses revealed that the IHLC and PHLC scales were statistically independent, whereas the PHLC and CHLC were positively correlated, and the IHLC and CHLC were negatively correlated. The internal reliability and factor structure of the instrument have been substantiated in other studies using healthy adults and alcoholics (Russell & Ludenia, 1983). Predictive validity has been established in groups of psychiatric patients and healthy adults (DeVellis, et al., 1980; Wallston et al., 1978).

In their research, Wallston and Wallston (1982) described eight groups which were formed by splitting each of

the three MHLC scales into 2-level dichotomous variables representing low and high scores, and then forming groups which represented various 3-way combinations of these dichotomous variables. The researchers predicted different health outcomes for each of these groups. For example, they hypothesized that patients with the combination of high IHLC, high PHLC and low CHLC, which they called "Believers in Control" should have better outcomes in negotiating through the health care system. They speculated that these patients would rely on themselves to make decisions and yet be open to the recommendations of physicians and other powerful others in the health care system. In the present research, the three MHLC scales were divided at the mean, producing the 2-level dichotomous variable for each scale. These 2-level variables were then combined into a summary measure which had eight levels, each of which corresponded to one of the eight groups described by Wallston and Wallston (1982).

Social support / social network status. Social support refers to the aid given by others to assist individuals towards their goals, which functions within the relationships which comprise the network of the support structure. The measure used in this research was the Norbeck Social Support Questionnaire (NSSQ) developed by Norbeck and associates (1981), which provides measures of the quality of social support and important characteristics of the social support

network. Respondents are asked to make a list of all the people who provide personal support to them, and indicate their relationship to that person (spouse, family, friend, neighbor, etc.). The subject is then asked to answer eight questions about each of the person listed, rating responses on a scale from 1 to 5. The questions assess the emotional and physical support available, the confidence placed in the support member, the duration of the relationship, and the frequency of contact. A final question concerns the loss of support members, either through death or other absence, and asks the respondent to rate the impact of that loss. Three major subscale scores can be derived from questionnaire responses: 1) total functional support, composed of the affective support given, the degree to which the support member affirms the actions and thoughts of the focal person, and the level of emotional and physical aid given; 2) total network properties, consisting of number of people in the network, and the duration of their relationship and frequency of contact with the focal person; and 3) total loss, which includes how many members were lost and the impact of this loss on the focal person. Each subscale produces a continuous measure.

A test-retest reliability study of the NSSQ items over a period of one week in a sample of nursing students demonstrated high reliability, with scores ranging from 0.85 to 0.92 (Norbeck et al., 1981). A high level of internal con-

sistency was found using intercorrelations among the items composing the three subscale components. Concurrent validity was established by comparing the NSSQ to the Cohen and Lazarus measure of social support, and adequate construct validity was found comparing the NSSQ to the POMS (Norbeck et al., 1981). Further reliability and validity studies in samples of employed adults and graduate nursing students demonstrated moderately high test-retest reliability over a seven month period (coefficients ranging from 0.58 to 0.78), and adequate construct, concurrent and predictive validity (Norbeck, Lindsey & Carrieri, 1983).

Measures of the Dependent Variables

There were 3 major categories of dependent measures used in this research: information variables, medical outcomes, and psychosocial outcomes. These measures are described in the sections which follow.

Information variables. The instrument used to measure P.T.C.A. patient knowledge were the Angioplasty Knowledge Survey (AKS), which was developed at Seton Medical Center by the author, Mary Murphy, R.N., M.S. (coordinator of P.T.C.A. patient care at Seton) and Jodi Fishman, R.N., M.S. (coordinator of P.T.C.A. patient rehabilitation). A pilot study was completed before the start of the formal study to construct the Angioplasty Knowledge Surveys. The P.T.C.A. cardiovascular clinical nurse specialists, an exercise physiol-

ogist, and dietary personnel were initially consulted to assist in generating a list of potential questions that would cover all aspects of the rehabiltation education given to angioplasty patients. Every procedural question developed was directly linked to information contained in a 25 minute slide tape presentation and a printed booklet, both designed specifically for educating P.T.C.A. patients at the facility. Some of the questions used in the risk factor section were based on the Cardiac Knowledge Test used by Shaw and associates (in press) in their study of heart attack patients. After all potential areas were covered and specific questions written, they were distributed to members of the cardiac rehabilitation team to determine if the questions were accurately stated, were understandable, were sufficiently challenging, and reflected the teaching given to angioplasty patients. The initial pool of items assessing procedural knowledge contained 2 multiple choice questions, one question in which patients were asked to check events which might occur before, during or after the procedure, 20 True-False questions, and a section in which patients checked complications associated with the procedure. The risk factor section contained one multiple choice question, an item in which patients checked foods that were appropriate for cardiac patients, a question in which patients were asked to list the major factors contributing to coronary artery disease, and 20 True-False questions on general risk factor information.

In the first phase of the pilot testing, all of the potential procedure and risk information items were pooled and given as one test. Twenty questionnaires were completed by 15 patients, with some patients completing the test both immediately upon arrival to the hospital, and then again before discharge. The initial group of 15 patients was composed of 8 patients who were having P.T.C.A. for the first time, and 7 patients who had previously undergone the procedure. Five of the new patients completed the test both before and after their procedures. The three remaining first time patients all completed their questionnaires before the procedure. Two of the repeat angioplasty patients were given the information test before the procedure, and the remaining 5 completed it after the procedure. The purpose of varying the administration of the test in this way was to produce the greatest amount of variance between responses, creating a distribution which would allow an assessment of the relative difficulty of each item, whether certain items appeared to be influenced by the educational program, and the effect patient experience had on responses. For example, if a question were missed by all patients on the pretest, regardless of their experience with angioplasty, the question was most likely too difficult or not relevant. If questions were missed by all patients on the posttest, it would indicate that the education did not have an effect on that area of information. And finally, questions which were

missed by new patients at the pretest but were answered correctly by repeat P.T.C.A. patients might be tapping important areas of information which are not typically known by new patients. The proportion of patients who answered each item correctly was calculated, both for the first time and repeat patients separately, and for the group as a whole. Items which were scored correctly by all new patients and appeared to be too easy on the pretest were examined, and all but 2 were discarded. Several items were missed by all patients, both new and old, before and after the slide tape and educational sessions. These were assumed to be too difficult or not relevant to the procedure and rehabilitation education and were dropped. The majority of items kept were those which tended to show variance between the pre and posttest situations. Based on these analyses, the items which were kept were divided into two versions of the knowledge test, Form 1 and Form 2 (see Appendices E and F). Each form contained an identical number of procedure and risk factor items, and the items were distributed so that there were equal numbers of easy, moderate and difficult items on each form.

These two forms were given to a group of 20 first-time angioplasty patients, with one form chosen randomly and given to each patient before he or she received the P.T.C.A. educational session, and the other form given to the patient to complete before discharge from the hospital. This format

was chosen because it was identical to the way testing would be done in the major research study, allowing the researcher to identify any problems in the testing situation as well as in the construction of the instrument. Each form took approximately 10 minutes to complete. The average pretest score for Form 1 was 28.4, and the score for Form 2 was 26.8, which were not significantly different from each other. The average posttest score for Form 1 was 34.9, and the score for Form 2 was 34.6, which were also not significantly different from each other. Based on these results, the two forms of the test were assumed to be equivalent and appropriate for use as alternate forms of measuring knowledge in the major research study. Since it seemed appropriate to include only coronary artery disease risk factor questions on the 6-month information follow-up, the risk factor items from forms 1 and 2 were combined and the value of the true-false items was adjusted to correspond to the scoring used for the individual risk factor sections on forms 1 and 2. It was assumed that after 6 months, patients would not be sensitized to the risk factor questions and that the responses to this combined version, Form 3, would accurately reflect their risk factor knowledge (see Appendix G). In this research, Form 1 and Form 2 were given randomly to patients at the pretest to insure that there were no systematic differences introduced by the knowledge instrument.

Medical outcomes. Three major medical outcomes were assessed in this research: 1) success of the procedure; 2) occurrence of complications over the 6 month period after the procedure; 3) occurrence of restenosis. Success of the procedure was determined by a rating scale[1] based on the amount of residual stenosis after the procedure (the original percent of stenosis minus the percent of stenosis after the procedure) and the residual pressure gradient (the original pressure gradient minus the gradient measured after the procedure). Values were assigned to the percent stenosis remaining after the procedure, with 0 stenosis receiving a 10 and greater than 60 percent residual stenosis receiving a 0. For the pressure gradient, the lower the residual gradient, the higher the value assigned for that outcome. Both scores were added, producing values from 0 to 20, with 20 representing the most successful and 0 the least successful procedure. For patients with multivessel disease, scores were calculated separately for each vessel and then averaged for a final score.

Occurrence of complications during the 6 months after the procedure was based on responses given by referring physicians who were contacted at the six-month follow-up (see Appendix H). Complications included hospitalization for chest pain, and occurrence of arrythmias or heart attacks.

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[1] This scale was constructed by Simon Stertzer, M.D., Director of Research at the San Francisco Heart Institute, Daly City, California

The last medical outcome, restenosis, was determined by documentation provided by referral physicians at the six-month follow-up. Results were categorized using 5 levels: 1) restenosis documented by angiography; 2) restenosis documented by a thallium treadmill test or significant decrease in the double-product (the multiplication of heart rate and systolic blood pressure before and after exercise on a treadmill) comparing a pre-P.T.C.A. treadmill test with the six month result; 3) no restenosis, documented by angiography; 4) no restenosis, documented by a significant increase in the treadmill double-product; and 5) indeterminant status (either due to patient refusing any tests, or because results of the treadmill double-product may have been influenced by medications the patient was taking).

Psychosocial outcomes. These outcomes included variables taken from the patient 6-month follow-up (see Appendix I). Four psychosocial variables were assessed at the 6-month follow-up: 1) psychological status; 2) level of social functioning; 3) for patients employed before their P.T.C.A., return to work; and 4) patients' perceptions of their work efficiency. Psychological status was measured using the Profile of Mood States (POMS) (McNair, Lorr & Droppleman, 1971) which has been used extensively in studies of rehabilitation in cardiac patients. The POMS is composed of 65 words which describe a variety of feelings. Patients are instructed to rate on a scale from 0 to 4 the degree to

which they have been experiencing that feeling over the past week. The instrument produces a total score of mood disturbance (based on the addition of the dimensions of tension, depression, anger, fatigue and confusion minus the score for vigor). The total mood disturbance scores was used in all data analyses. A high degree of internal consistency for the items of the POMS (above 0.90) has been reported, while test-restest reliabilities range from 0.65 to 0.74 (McNair et al., 1971). Predictive and construct validity for the POMS have been well established in psychotherapy studies, and adequate concurrent validity between the POMS and the Hopkins Symptom Distress Scale has also been reported (McNair et al., 1971).

Level of social functioning was measured using part of the scale developed by Soloff (1980) for use with cardiac patients. The social functioning scale is composed of 7 items in which patients rate their level of involvement in hobbies, outdoor recreation, community church involvement, social activities and work (see Appendix I). The instrument produces a continuous variable ranging in value from 0 to 12. No studies currently exist which establish the reliability or validity of this scale. Patient ratings from the two work-related items of this scale were extracted and used as separate outcome measures. Response to item 1 indicates if the patient has returned to work, and whether he or she is working full-time at the same job, at another less de-

manding job, or is working part-time at the job held before the P.T.C.A. procedure. In item 2, patients are asked to rate the level of efficiency at which they feel they are working as compared to before the procedure. Patients may respond that they are working less, the same, or more efficiently at 6 months than before their angioplasty. These two measures were used as outcomes variables in the 6-month data analyses.

Other patient information. In addition to the variables mentioned above, other information about the patient and the procedure was collected. Demographic information included age, sex of the patient, marital status, religious preference, and educational level. After the Avoidance-vigilance interview was completed with patients, their IQ was measured. This was an important parameter to measure since it was necessary to assess how individual intellectual capacity varied from patient to patient, and educational level alone is not considered to be an accurate assessment of intellectual capacity. IQ was measured using the 40-word Vocabulary Subscale of the Wechsler Adult Intelligence Scale (WAIS). This vocabulary subtest was chosen because it is easily administered and reliability studies have demonstrated correlations of between 0.85 and 0.91 on this subscale compared with IQ scores obtained from administration of the entire WAIS (Wechsler, 1981). The final scores from this subscale were adjusted for age based on tables found in the WAIS

scoring manual, since there is a proven linear decrease in IQ as age increases.

A number of medical variables were abstracted from the hospital record of each patient, including cholesterol and triglyceride levels, history of heart attack, cardiac ejection fraction, and information about the angioplasty procedure (per cent stenosis before and after, pressure gradient before and after, which vessels were occluded, which were successfully treated, and any complications the patient had during or after the procedure). A severity of illness scale was developed[2] by combining the information about the number of arteries occluded, history of heart attack, and whether the cardiac ejection fraction was abnormal. The range for this index was 1 to 5, with a score of 1 meaning that the disease was not very serious, and a score of 5 reflecting very serious coronary disease.

Procedure

The study design involved a pretest and 2 posttests of the Angioplasty Knowledge Survey, four measures of state anxiety, (at the pretest, the night before the procedure, at discharge, and 6 months after discharge), measures of the major independent variables during the evening before the procedure, measures of medical outcomes immediately following and

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[2] This scale was developed in conjunction with Thomas Ports, M.D., Associate Professor of Medicine and Director of Cardiology, University of California, San Francisco.

6 months after the procedure, and assessment of psychosocial outcomes 6 months after the procedure. An educational intervention was given to all patients which included a 25 minute slidetape on the procedure and coronary risk factors, a booklet covering the same information, two sessions with the cardiovascular clinical nurse specialists (one before and the other after the angioplasty procedure), and sessions with staff from the dietary and exercise physiology departments. The following sections outline the stages of the research as they occurred sequentially.

1. Upon admission to the hospital, patients who met the study criteria were approached by the cardiovascular clinical nurse specialist, who gave the patient a general explanation of the research and asked if the patient wanted to participate in the study. If the patient agreed, he or she was asked to sign the appropriate consent forms. After signing the appropriate consent form, the patient was assigned a number and given the Angioplasty Knowledge Survey form which corresponded to the pretest for that patient packet (Forms 1 and 2 were randomly assigned for use as pre or post tests when the patient packets were put together). Patients also completed the Adjective Generation Technique (AGT) form immediately after completing the AKS. The two instruments took about 15 minutes for patients to complete. The patient was

then given the education intervention, including the slidetape, booklet, and visits by the clinical nurse, the cardiologist, and the cardiac surgeon and anesthesiologist who would be involved if bypass surgery were necessary.

2. During the evening before the procedure (after the pretest and education had been completed), the author interviewed the patient for about 30 minutes. The interview was designed to assess patients' status on avoidance-vigilance. After completing the interview, patients' IQ levels were determined using the WAIS vocabulary subscale. Patients were then given the Patient Inventory questionnaire (to assess their status on repression-sensitization, state-trait anxiety, and the health locus of control scales) and were instructed to complete the questionnaire that evening, as it was extremely important that it be done before the procedure. Patients were also given the NSSQ social support questionnaire with instructions to complete it that night if possible, provided that they had done the Patient Inventory. If they did not complete the NSSQ that night, patients were instructed to complete it sometime before discharge from the hospital. Both of these questionnaires together required about 30 minutes of time to complete.

3. As soon as patients were stable after the P.T.C.A. procedure, staff from the dietary department gave them an educational session about dietary issues. Patients then received consultation about exercise from members of the cardiac rehabilitation team and exercise physiologists. The cardiovascular clinial nurse specialist then gave each patient an educational session in which return to activity was discussed, along with information about medication and general coronary risk factors. The alternate form of the AKS was given to the patient by the P.T.C.A. nurse as closely as possible to the time of discharge. Patients completed the AGT state anxiety measure at the same time. These questionnaires took patients about 20 minutes to complete. In a few cases where discharge plans were altered and patients were scheduled to leave earlier than expected, a stamped envelope addressed to the hospital was included for patients to return questionnaires. This occurred in about 15% of the sample, with 7 of these patients never returning the questionnaires. They were dropped from the analyses involving information and anxiety outcomes.

4. Six months after the P.T.C.A. procedure, the physician who referred the patient to Seton was sent a brief questionnaire which included questions about the patient's current medical status, results of an-

giography, treadmill and lab studies, and ratings of the patient's current condition compared to the patient's status before having the P.T.C.A. procedure (see Appendix H). If physicians did not respond within 3 weeks, they were contacted by phone, and information was obtained either by sending another questionnaire, or was taken verbally over the phone. Physicians who returned questionnaires with incomplete medical information were also contacted by phone to determine if the information was available from other sources. Patients were sent a 6-month follow-up questionnaire which included Form 3 of the Angioplasty Knowledge Survey (see Appendix C), questions about work and social functioning, the AGT state anxiety measure, and the POMS mood status measure.

RESULTS

Preliminary Data Analyses

The first data analysis task was to establish the reliability of the scoring used to generate the avoidance-vigilance total and component scores from the interview. A random sample of 20 avoidance-vigilance interviews was selected, and these tapes were rated independently by a trained rater.[3] A interrater reliability coefficient of 0.94 was achieved for the total avoidance-vigilance score, and reliability scores of 0.84 and 0.85 were obtained for the acknowledgement/avoidance of emotional content and information seeking/accuracy/completeness subscales. These results indicate that the scoring of the avoidance-vigilance interview was highly reliable, and is consistent with other reports in the literature (Cohen, 1975; Cohen & Lazarus, 1973; La Montagne, 1982).

An analysis was done to determine if patients who did not respond to the 6-month questionnaire were different from responders. This analysis revealed that compared to patients who returned the 6-month questionnaires, the seventeen non-responders were significantly younger (51 years of

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[3] This coding was performed by Jane Sprouse, M.S., an experienced rater from the Learning Disabilities Center, San Francisco.

age versus 57 years of age), had procedures which were rated
as more successful (16.6 versus 13.6), and had higher scores
on the MHLC scale of belief in powerful others (26.2 versus
22.5). In addition, since it was a concern that a small
group of patients (13%) had previously had coronary bypass
surgery, an analysis was done to determine if this group
differed significantly from patients with no history of cor-
onary bypass on the major dependent and independent vari-
ables. These analyses revealed no difference between the
groups, and in subsequent analyses no distinction was made
between patients based on history of coronary bypass sur-
gery.

Major Data Analyses

The following sections include analyses of the simple corre-
lations between the major variables of interest, and a fur-
ther exploration of these relationships using a multiple re-
gression correlation (MRC) approach. Multiple regression
using hierarchical entry of variables was chosen because it
permits organized testing of hypotheses and produces statis-
tics which specify the unique effect of each variable on the
outcome measure, excluding the variance that that variable
shares with other independent factors. It is also the most
powerful method for controlling the effect of pretest meas-
ures on posttest results (Cohen & Cohen, 1975).

Correlational Findings

Psychosocial/Medical Factors Related to Information Levels

The Pearson Correlation Procedure was used to examine the simple correlations between the continuous psychosocial and medical variables and the measures of information level. Table 3 presents these relationships. Patient age is not related significantly to any of the pretest measures of knowledge, but it is negatively correlated with all posttests of information and the 6-month information score. This finding suggests that older patients learn less total knowledge, and less procedural and risk information. Educational level is positively and significantly related to all of the pretest scores except risk information, and to all the posttest scores and the 6-month assessment of risk knowledge. IQ is significantly positively related to all pretest knowledge measures, all postest knowledge measures except risk knowledge, and to the 6-month score. The correlation between IQ and education was substantial (r = 0.49; p<.001). It is worth noting that IQ was not significantly correlated with age (r = -0.01; n.s.), demonstrating that the adjustment of IQ for age based on the WAIS scoring manual was effective in eliminating the linear relationship between these two variables. Age and education were moderately correlated (r = -.21; p<.02).

The total measure of avoidance-vigilance was negatively associated with the difference between the pre and post

TABLE 3

Correlations: Psychosocial/Medical and Knowledge Scores

Psychosocial/Medical	Total Pretest	Procedure Pretest	Risk Factor Pretest	Total Posttest	Procedure Posttest	Risk Factor Posttest	Total Post-Pre	Procedure Post-Pre	Risk Factor Post-Pre	6-Month Risk
Age	-.11	-.10	-.06	-.32#	-.36#	-.19*	-.16	-.16	-.09	-.28#
Educational Level	.32#	.37#	.14	.27#	.22#	-.06	-.06	-.14	-.05	.27#
I Q	.30#	.30#	.17*	.19*	.20*	.13	-.09	-.10	-.04	.26#
Avoidance Vigilance-Total	.36#	.38#	.19*	.21*	.16*	.18*	-.12	-.18*	-.02	.30#
Avoidance Vigilance-Seek	.31#	.31#	.18*	.28*	.22*	.25#	-.03	-.09	.04	.42#
Avoidance Vigilance-Emot	.33#	.36#	.15	.12	.09	.09	-.16	-.22*	-.06	.14
MHLC - Internality	-.05	-.12	.04	.06	.05	.13	.08	.07	.07	-.02
MHLC - Chance	.02	.04	-.01	-.18*	-.18*	-.12	-.15	-.15	-.09	-.09
MHLC - Powerful Others	-.27#	-.24#	-.17*	-.15	-.24#	-.03	.09	.03	.11	-.06
Pre AGT State Anxiety	-.10	-.13	-.02	.10	.09	.08	.16	.17	.08	-.12
Post AGT State Anxiety	.30#	.24*	.22*	.03	.04	.02	-.20*	-.16	-.16	.17
STAI - State Anxiety	.07	.04	.06	-.09	-.01	-.15	-.13	-.04	-.16	-.06
STAI - Trait Anxiety	.12	.02	.15	-.04	-.08	-.01	-.12	-.07	-.13	.16
Social Support Functional	-.01	-.13	.11	.24*	.21*	.19*	.19*	.25*	.06	-.08
Social Support Loss	.03	.06	-.01	-.01	.04	-.04	-.03	-.02	-.02	.17
Social Support Network	.08	-.05	.16	.17	.13	.16	.07	.12	-.01	.15
6-Month AGT State	.07	.01	.10	-.08	.09	-.21	-.12	.06	-.26*	.04
6-Month Social Function	.05	-.09	.09	.30#	.27#	.23#	.21#	.20*	.12	.14
6-Month Mood Status	-.07	-.12	.01	-.08	-.01	-.12	-.01	.09	-.11	.08
Taylor M A S	-.13	-.19	-.01	-.02	-.08	.03	.08	.09	.04	-.04
Marlowe Crowne S.D.	-.02	-.04	.02	-.04	-.02	-.05	-.02	.02	-.05	.07
Procedure Success	-.22*	-.24#	-.10	.11	.13	.06	.26#	.28#	.13	.05
Severity of Illness	.14	.03	.17*	.16	.01	.24#	.01	-.02	.04	.17
Arteries Occluded	.14	.01	.21*	.18	.02	.25#	.02	.02	.02	.18

* = Significant at .05 level; # = Significant at .01 level.

procedural knowledge scores. This suggests that patients scoring toward the avoider end learned less information, and those scoring towards the vigilant end gained more procedural information during hospitalization. The measure is highly and significantly related to all the pretest scores, but only moderately related to the posttest scores. This suggests that the influence of the information seeking variable may have been greater impact before hospital admission rather than during the hospitalization. The avoidance-vigilance measure is positively correlated with the 6-month knowledge assessment. It appears that the information seeking component of the avoidance-vigilance score is more strongly correlated with the information outcomes than is the acknowledgement of emotion component. These findings would be expected theoretically and substantiate the validity of this measure. State anxiety measured the night before the procedure was not related to any of the information scores. State anxiety measured after the procedure was negatively correlated with the difference between pre and post total knowledge scores, but was positively correlated with all of the pretest knowledge measures. This suggests that people who were anxious after the procedure had less knowledge gain, even though they had higher levels of knowledge before the procedure. Trait anxiety was not related to any measures of anxiety. The Powerful Others scale of the MHLC was negatively related to all of the pretest knowledge scores,

and negatively related to posttest procedure knowledge. This suggests that patients who have a strong belief in powerful others knew less when they came to the hospital, and gained less information about the procedure while they were hospitalized. Greater belief in chance was negatively correlated with posttest total knowledge and procedural information scores.

Severity of illness and number of arteries occluded were both positively related to pretest and posttest measures of risk knowledge, suggesting that sicker patients knew more about coronary risk factors. Patients who had more successful procedures had greater gains in total and procedural knowledge. These variables were negatively related to pretest total and procedural knowledge scores. This suggests that patients who started out knowing less and eventually learned more tended to have more successful procedures. Total functional level of social support was positively related to changes in total and procedural knowledge, and positively related to all posttest knowledge scores, suggesting that patients with higher quality of support learned more. Lower risk factor information difference scores were correlated with higher levels of state anxiety at 6 months after the procedure. All pretest and posttest scores of knowledge were positively correlated with level of risk knowledge at six months (ranging from .22 to .47, all significant at the .05 level). Six-month knowledge level was

not correlated with changes from pretest to posttest for any of the information scores.

To determine whether there was variance between the pretest and posttest measures of information, t -tests of the mean differences between the pretest and postest total knowledge and component information scores were performed. These analyses demonstrated a highly significant difference between pretest and postest information levels for the total knowledge score and the procedural and risk factor components (See Table 4). These results demonstrate that the patient group taken as a whole did make significant gains in information between their hospital admission and discharge after the procedure.

TABLE 4

T-tests of Mean AKS Scores

AKS Information Score	Mean	Std. Dev.	t-value	Prob.
Pre-Total Score	30.5	5.7		
Post-Total Score	37.7	5.6	-9.34	p<.001
Pre-Procedure Score	13.1	3.5		
Post-Procedure Score	16.9	3.1	-8.03	p<.001
Pre-Risk Factor Score	17.4	3.9		
Post-Risk Factor Score	20.8	3.6	-6.95	p<.001

N=90

Psychosocial Variables Related to Medical Factors

The Pearson Correlation Procedure was also used to examine the simple correlations between the continuous psychosocial and knowledge variables and the measures of medical and psychosocial outcome. See Table 5 for a presentation of these relationships. Age was significantly and negatively correlated with anxiety measured the night before the procedure, mood status immediately after the procedure and at 6 months, and with educational level. Age was not correlated signifi-

cantly with severity of illness or success of the procedure. Educational level was negatively correlated with belief in powerful others, indicating that patients with less education had more belief in powerful others.

A number of significant correlations were found between scales of the MHLC and other variables. The internality measure (IHLC) was positively related to the belief in powerful others and severity of illness. The IHLC scale was negatively correlated with state anxiety measured after the procedure, the emotional dimension of the avoidance- vigilance scale, and with belief in chance. The measure of belief in powerful others (PHLC) was negatively correlated with IQ, with avoidance-vigilance, both the emotional and the seeking components, with trait anxiety, and with state anxiety measured after the procedure. The measure of belief in chance (CHLC) was positively correlated with trait anxiety, state anxiety measured before the procedure and 6 months after, and with mood disturbance measured before and 6 months after the procedure. The CHLC scale was negatively correlated with social functioning measured 6 months after the procedure. A number of significant relationships were found for the total avoidance-vigilance score. The total score was positively related to state anxiety measured after the procedure, trait anxiety, mood disturbance at discharge, and the measures of IQ and education. The total avoidance-vigilance score was negatively correlated with age. Corre-

TABLE 5

Correlations: Psychosocial and Medical/Functional Outcomes

VARIABLES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. Age	-----																						
2. Education	-.21*	-----																					
3. I Q	-.02	.49#	-----																				
4. Avoidance-Vigilance-Total	-.29#	.54#	.38#	-----																			
5. Avoidance-Vigilance-Seek	-.27#	.41#	.31#	.85#	-----																		
6. Avoidance-Vigilance-Emot	-.05#	.55#	.38#	.91#	.56#	-----																	
7. MHLC - Internality	.05	.05	.05	-.13	-.02	-.18#	-----																
8. MHLC - Chance	-.01	.05	.01	-.05	-.10	-.01	-.12	-----															
9. MHLC - Powerful Other	.11	-.26#	-.36#	-.23#	-.22#	-.19#	.28#	.21#	-----														
10. Pre ACT State Anxiety	-.09	-.01	-.14	.06	-.03	.12	-.10	.07	.14	-----													
11. Post ACT State Anxiety	-.20*	.14	.07	.23#	.20*	.21#	-.30#	-.06	-.24#	-.16	-----												
12. STAI - State Anxiety	-.29#	.13	-.01	.37#	.12	.47#	-.15	.16	.06	.32#	.11	-----											
13. STAI - Trait Anxiety	-.12	.06	.08	.31#	.16	.35#	-.02	.22#	.08	.09	.15	.49#	-----										
14. Social Support-Functional	-.18	-.03	-.09	-.01	-.05	-.05	-.03	-.08	.16	-.06	-.14	.06	.24#	-----									
15. Social Support-Loss	-.09	-.02	.03	.16	.14	.15	.19*	.16	-.07	.08	.15	.17	.25*	.06	-----								
16. Social Support-Network	-.16	-.04	-.18	-.01	-.05	-.04	-.02	-.10	-.14	-.14	-.16	.01	.17	.93#	.03	-----							
17. 6-Month ACT Anxiety	-.02	-.19	-.01	-.10	.05	.11	-.03	-.22*	.13	.13	.09	.16	.06	.01	-.13	-.05	-----						
18. Taylor MAS	-.09	-.04	.05	.07	.02	.09	.11	.31#	.34#	.15	-.04	.25#	.68#	.31#	.12	.22*	.11	-----					
19. Marlowe Crowne S.D.	.03	-.14	-.32#	-.07	-.01	-.11	.07	-.01	-.04	-.02	.15	-.13	-.27#	-.13	-.02	-.07	.01	-.33#	-----				
20. Severity of Illness	.11	.06	.10	.04	.01	-.06	.20*	.03	.05	.02	.28#	-.12	-.04	-.02	-.15	-.04	.07	.08	-.09	-----			
21. Arteries Occluded	.13	.12	.18	.09	.08	.08	.06	-.02	-.02	.12	.24#	-.01	-.02	-.09	-.16	.09	-.16	.03	-.11	.83#	-----		
22. Procedure Success	.05	-.13	-.02	-.12	-.04	-.15	-.06	-.06	-.02	.04	-.09	-.09	-.01	.06	-.03	.01	.06	.06	.03	.01	-.16	-----	
23. 6-Month Social Function	.06	-.01	.13	-.01	-.09	-.09	.16	-.32#	-.07	-.04	-.07	-.29#	-.14	-.14	-.14	-.13	-.15	-.19	.11	.01	-.05	.36#	-----
24. 6-Month POMS	-.36#	.09	-.03	.25#	.08	.32#	.02	.16	.01	-.02	.17	.40#	.40#	.13	-.08	-.02	.23*	.33#	-.19	.07	.09	-.07	-.58#

* = Significant at .05 level; # = Significant at .01 level.

lations demonstrated that the emotional component of the avoidance-vigilance score was the factor which was primarily responsible for the relationship of the total score to trait and state anxiety levels, and mood disturbance at 6 months. State anxiety measured after the procedure was positively related to severity of illness. Both state and trait anxiety measured using the Spielberger STAI were positively correlated with mood disturbance at 6 months. Mood disturbance after the procedure was negatively correlated with severity of illness. A number of social support findings emerged. Patients with higher levels of trait anxiety also had higher levels of functional support. More social support loss was correlated with higher trait anxiety scores and more mood disturbance at 6 months after the procedure.

Several other correlational relationships are worth noting. Success of the procedure was positively correlated with social functioning level at 6 months. Higher scores on mood disturbance at 6 months were related to lower levels of social functioning. Risk knowledge at 6 months was not correlated significantly with level of social functioning or mood disturbance at 6 months.

Information, Anxiety and Procedural Success Findings

Multiple Regression Correlational Analyses were used to ex-
amine the interrelationships among the independent variables
and their relationships to the outcome measures. Regression
analyses were performed using 3 categories of dependent
variables as outcomes: 1) the AKS information scores (total,
procedural and risk factor scores) for both the pretest and
posttest; 2) measures of state anxiety the night before the
procedure, prior to discharge, and at 6 months after the
procedure; and) the measure of success of the procedure.
The following sections present the results of these analy-
ses.

Information Level At Hospital Admission

A regression analysis was performed to determine if any
unique and significant relationships existed between select-
ed psychological variables and level of information patients
had upon admission to the hospital (in the following sec-
tions sr is used to refer to the semi-partial or unique cor-
relation between independent and dependent measures). In
these analyses, IQ, age and severity of illness were entered
first, followed by sex, trait anxiety, the MHLC scales, the
total avoidance-vigilance score, the 4-level repression-sen-
sitization measure, and the measures of social support. In-
teractions between all of the independent variables were en-
tered in the final steps to remove any common variance

shared by variables and to determine if any particular combinations of independent variables were uniquely related to the dependent measure. In analyses examining the pretest AKS knowledge scores, none of the independent variables were significantly related to pretest measures of total knowledge or knowledge about the procedure. There were significant relationships in the regression of independent variables on pretest Coronary Risk Factor Information score. The PHLC score was significantly and negatively related to risk factor knowledge (F = 4.01; p<.05; sr = -0.25), suggesting that patients who believed powerful others exert control over their health tended to know less about risk factor information upon admission. This finding is contradictory to the prediction made in Hypothesis A.5, which stated that patients with a greater belief in powerful others should have higher scores on the pretest of knowledge. There was also an interaction between the total avoidance-vigilance score and the measure of repression-sensitization (F = 4.59; p<.03; sr = 0.27). A plot of this interaction demonstrated that patients who were classified in the middle group on the repression-sensitization measure had significantly lower risk information scores than the other groups if they used avoidance, but had significantly higher scores than the other repression-sensitization groups if they were vigilant towards information about P.T.C.A. (see Figure 3). This finding suggests that patients who did not exhibit a preference

for either extreme of the coping disposition (i.e., a pref-
erence for using repression or sensitization as their prima-
ry coping disposition) demonstrated very dramatic differenc-
es in knowledge scores depending on whether they used avoid-
ance or vigilance. On the other hand, patients who did
demonstrate a strong dispositional coping preference were
less affected by situational influences which would have
caused them to be more likely to use either avoidance or
vigilance. These patients demonstrated less coping flexi-
bility, which led to significantly higher information scores
than the middle group at the avoidant end of the coping
spectrum, and significantly lower information scores than
the middle group at the vigilant end of the coping spectrum.
Thus, the dispositional and episodic coping measures do not
follow the same pattern of relationship to the information
outcome. These findings provide partial support for Hy-
pothesis A.1, but introduce an interaction between the epi-
sodic and dispositional measures of coping which was not ex-
pected. The results also demonstrate the importance of
identifying those subjects who do not demonstrate a prefer-
ence for a particular coping stance or disposition (i.e.,
the "middle group"), since this group may have outcomes sub-
stantially different from those who are classified at the
extremes of a particular dimension. The analyses described
above were also performed using the emotional and seeking
components of the avoidance-vigilance scale in separate re-

gressions. These analyses demonstrated that the seeking component was primarily responsible for the significance found for risk factor knowledge. Additionally, when the seeking and emotional components were analyzed separately, the dispositional-episodic coping interaction was significant for both the total knowledge and coronary risk factor scores, producing a relationship between the coping measures which was identical to the pattern presented in Figure 3 ($\underline{F}$ = 4.08; p<.05; $\underline{sr}$ = 0.31).

Figure 3:   Plot of Pretest Risk Factor Interactions
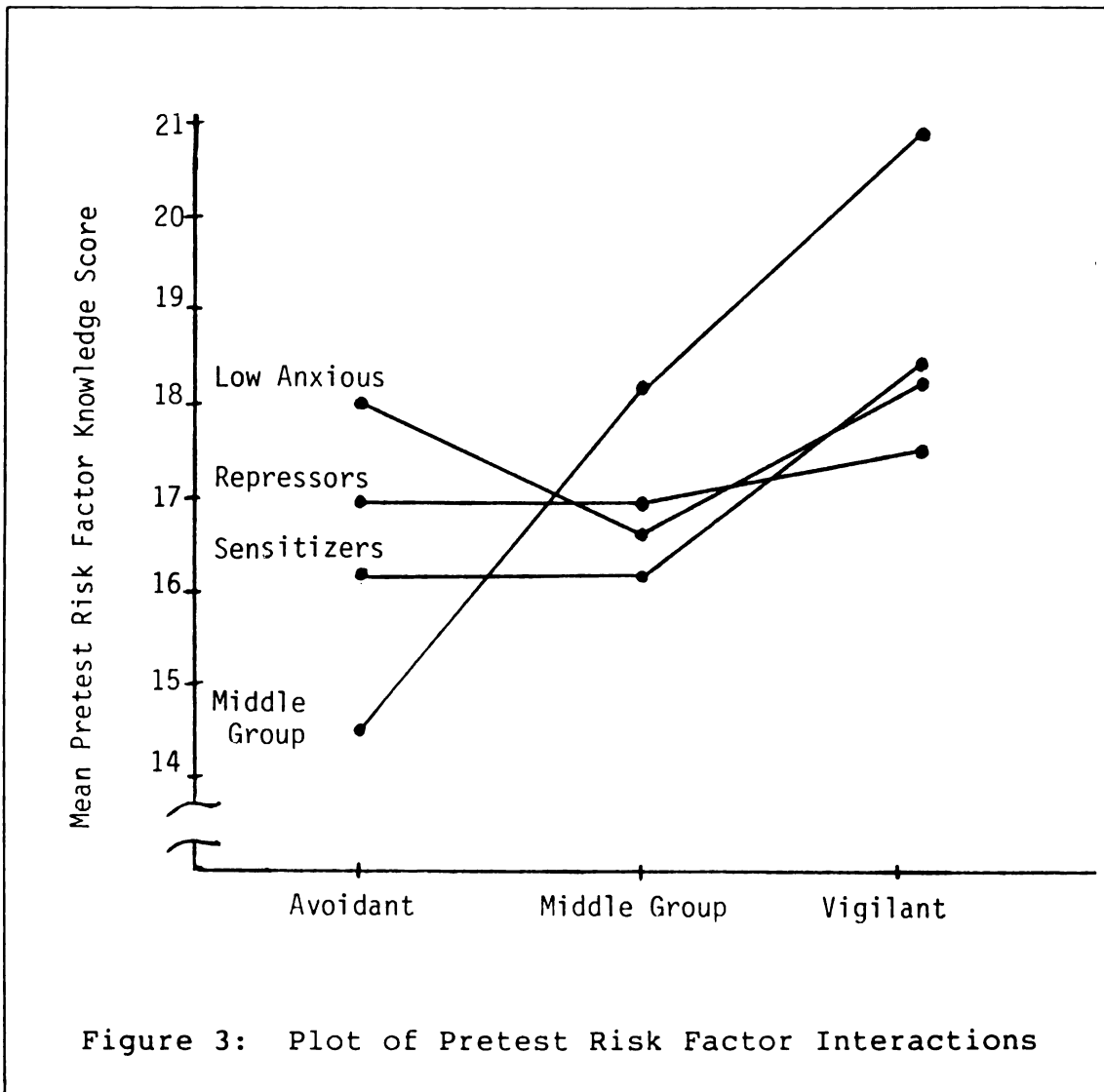
Information Gain

Regression analyses were used to examine the relationship of the independent variables to posttest knowledge scores for total knowledge, and procedural and risk factor information. In all of these regressions, the pretest score which corresponded to the information outcome used as the dependent variable was entered first in the regression analysis, ad-

justing the posttest information outcome before any of the other independent factors were entered. This "covariate approach" is the most powerful way to study relationships between pretest and posttest measures because it does not assume a perfect corrlation between them, as is the case when simple difference scores are used (Cohen & Cohen, 1975). Using the posttest total knowledge score as the dependent variable, regression analyses were done entering the pretest total knowledge score, IQ, severity of illness and success of the procedure as the first set of variables. Sex, age, state anxiety before and after the procedure, the 4-level repression-sensitization measure, the MHLC scales, the total avoidance-vigilance score, and the social support variables were entered next in hierarchical order. Interactions between all the independent measures were entered last. The regression model accounted for 37% of the variance in the total knowledge score, with the repression-sensitization measure significantly related to knowledge gain (F = 6.42; $p < .01$; sr = 0.30). Similar results were obtained in regression analyses using the posttest procedural and risk knowledge scores as the dependent variables, with repression-sensitization significantly related to procedural knowledge gain (F = 4.29; $p < .05$; sr = 0.25) and to risk factor knowledge gain (F = 3.78; $p < .05$; sr = 0.24). A plot of the means demonstrated that the significance was attributable to the difference in scores between the true repressor and low

anxious groups. See Table 6 for the means of the knowledge tests in the repression-sensitization groups. These findings suggest that true repressors gain significantly less knowledge in all areas compared to the truly low anxious group, even when IQ, prior level of knowledge, and medical status have been controlled. These results provide support for Hypothesis A.3 and parallel the findings reported by Shaw and associates (in press) for heart attack patients who were true repressors. The findings reported here are slightly different, however, in that the strongest relationship between repressive style and knowledge occurs for the total knowledge score, whereas the relationship was more substantial for risk factor information in the Shaw et al. study. This inconsistency may have been a result of the different sample (myocardial infarction versus P.T.C.A. patients) or of the length of time patients were exposed to the P.T.C.A. educational intervention, which was significantly shorter in the current study (3 to 4 days in the present study as compared to 8 to 14 days in the other). This explanation would follow from the findings of Shipley et al. (1979) which demonstrate that more negative outcomes occur for repressors who undergo repeated exposure to preparatory stimuli. No support was found for Hypothesis A.2, stating that patients who used avoidance should gain less P.T.C.A. information.

TABLE 6

Repression-sensitization Means for Knowledge Scores

MEAN KNOWLEDGE SCORES

R-S Groups	Total Score	Procedural Score	Risk Factor Score
True Repressors	36.80	16.28	20.52
Mixed Group	37.64	17.43	20.21
Sensitizers	37.66	16.43	21.23
Low Anxious	39.80	18.21	21.58

N=90

Similar regression analyses were used to examine the 6-month risk factor knowledge score, which was used as the major dependent variable. None of the independent variables entered were significantly related to this knowledge outcome. These results provide no support for Hypotheses A.4 and A.6. A multivariate profile analysis was attempted to examine all three of the risk factor scores simultaneously

over time, from the initial pretest to the 6-month score. The power of this analysis was reduced because patients who did not complete all three knowledge tests were dropped from the analysis, leaving only 67 patients. Although no factor reached traditional levels of significance, the measure of repression-sensitization had the lowest p-value (p=.15) of the independent factors examined.

Success of the Procedure

A regression analysis was used to examine the relationship between independent variables and the success of the procedure. In this analysis, all of the medical and psychological measures mentioned in the previous analyses were again used as independent variables, and the difference score between the pretest and posttest total knowledge scores was added as an additional independent factor. In this analysis, the only independent variable significantly related to success of the procedure was history of heart attack (F = 5.88; p<.01; sr = -.32), suggesting that patients who have had heart attacks tend to have less successful procedures. The knowledge difference score and state anxiety measured the evening before P.T.C.A. were both significant when entered into the regression equation, but interactions between these variables and other psychological and medical factors demonstrated that the variance they accounted for was not uniquely associated with the success of the procedure.

These results provide no support for hypotheses B.1, B.2 and B.3.

Changes in State Anxiety Over Time

To study the changes in state anxiety over time, three multiple regressions were performed using state anxiety the evening before the procedure, state anxiety after the procedure, and state anxiety measured 6-months after P.T.C.A. as the three dependent variables. In the first regression analysis, severity of illness and anxiety measured at the AKS pretest administration were entered as the first variable set to control for their effects on the outcome before other independent factors were entered. Then sex, age, the AKS pretest score, measures of episodic and dispositional coping, the health locus of control scores, and the social support measures were entered hierarchically as the next variable sets. State anxiety the night before the procedure was the dependent measure. This regression model accounted for 30% of the variance in state anxiety. However, none of the independent measures accounted for a significant amount of variance in state anxiety measured the night before the procedure. Thus, none of the Hypotheses C.1 through C.4 were supported for significant relationships between the independent variables and level of anxiety measured the evening before the procedure.

A similar regression analysis was used to study the relationship of the major independent variables to level of state anxiety measured after the procedure, controlling for the level of state anxiety measured during the evening before the procedure and for success of the procedure. In these analyses, the regression model accounted for 27% of the variance in state anxiety, with the IHLC and PHLC scales from the Multidimensional Health Locus of Control measure correlating significantly with anxiety after the procedure (IHLC, F = 6.21; p<.01; sr = -0.31; PHLC, F = 4.85; p<.05; sr = -0.28). These findings suggest that patients who are classified as internals and believe that powerful others influence their health tend to have lower levels of state anxiety after the procedure, controlling for prior level of anxiety and success of the procedure. This pattern corresponds to the configuration of IHLC and PHLC scores referred to by Wallston and Wallston (1982) as the "believers in control," who were expected to have better psychological and physical health outcomes. These results offer partial support for Hypothesis C.3.

The same independent variables described above were used in a regression analysis in which the level of anxiety measured 6-months after the procedure was the dependent outcome variable. This analysis revealed that the major predictor of state anxiety at 6 months after the procedure was the size of the social support network (F = 4.59; p<.05; sr

= -.53), suggesting that patients with smaller support networks have greater levels of anxiety, even when procedural success and severity of illness have been taken into account. This regression model accounted for 61% of the variance in the 6-month state anxiety score. These results provide partial support for Hypothesis C.4, which stated that poorer social support and smaller networks would be related to higher levels of anxiety 6 months after the procedure.

In an attempt to examine trends across time using all of the anxiety scores simultaneously, a multivariate profile analysis was used similar to the one described in the knowledge results section. The two preprocedural state anxiety measures, the postprocedural and the 6-month scores were all entered as dependent variables, and the psychological, medical and social factors were used as independent variables. The power of the analysis was again compromised, since fewer than 60 patients had scores for all 4 time points. None of the factors reached traditional levels of significance, but the total network size did have the smallest overall p-value (p=.10) compared to the other independent factors.

Analyses of 6-Month Medical and Functional Outcomes

Four major outcomes were studied at 6 months after the procedure: 1) restenosis of the P.T.C.A. site; 2) occurrence of complications during the 6 months after the procedure; 3) level of social functioning and mood disturbance; and 4)

rate of return to work and work efficiency. Logistic regression, multiple correlation regression, analysis of variance, and Chi-square procedures were used to examine the relationship of psychosocial, medical and informational factors to these outcomes.

Restenosis Outcomes

Although 100% of the referring physicians provided 6-month medical information for their patients, angiographic results were available on only 30 of the patients followed. Thallium treadmill results and data comparing double-product calculations (ratio of heart rate and systolic blood pressure at rest and at peak exercise during a treadmill) of 6-month treadmill results to pre-P.T.C.A. treadmills were available on an additional 43 patients. Since coronary angiography is the most conclusive test in determining restenosis, classification of restenosis rate obtained from thallium treadmill and double product calculations are not as reliable, although some studies suggest that these results can be used with a reasonable degree of confidence in determining restenosis (Levine, Ewels, Rosing, & Kent, 1983; Wijns et al., 1983). The rate of restenosis for this sample was 29%, which corresponds to findings reported in medical studies of restenosis in P.T.C.A. patients (Detre & Kelsey, 1983; Kent et al., 1982). Since the restenosis outcome was conceptualized as a dichotomous result (restenosis versus no resteno-

sis), logistic regression and Chi-square analyses were used to relate independent and dependent measures. Logistic regression is the appropriate regression model to use in situations where the dependent variable is not a continuous measure, which is the case for the dichotomous measures of restenosis, occurrence of complications and work function outcomes used in this study.

Logistic regression was used in the first analysis, in which restenosis was the major dependent variable. In this and all subsequent analyses of medical outcomes, patients who had unsuccessful procedures were dropped from the analyses. Age, history of a heart attack, single versus multi-vessel disease, angina class, success of the procedure, duration of cardiac symptoms, and sex were entered as the primary demographic/medical predictors. Next, the combination of coping style and information level used by Cromwell and associates (1977) and Shaw and associates (in press) was entered (referred to as coping style-information match), the three MHLC scores, and the three social support summary measures which described the functional level and size of the support system, and the amount of loss experienced by the patient. The first regression analysis including all of the variables did not pass the goodness-of-fit Chi-square test, indicating that the regression equation generated was not a good fit for the data. All of the psychosocial variables with the exception of coping style-information match,

amount of social support lost, and support network size had extremely small regression coefficients. The coefficients for the social support variables were low, although the ratio of the coefficients to the standard errors was around 1.5 (significance level was a ratio of about 2.0). The direction of these ratios indicated that patients with a greater amount of loss were more likely to have relapse, as were patients who reported small support networks. A problem with including the social support variables in the logistic regression analysis was that 24 patients were dropped from the analysis because they did not complete the social support questionnaire. This reduced the power of the analysis and added to the instability of the model generated. For these reasons, the logistic regression was repeated without the social support measures. In this analysis, only four patients were lost because of missing data on the psychosocial measures, bringing the total sample size to 69 of the 73 patients who had 6-month follow-up data and a successful P.T.C.A procedure. Age, sex, the medical variables and the coping style-information match variables were entered. Since previous multiple regression results reported in the procedural success section of this study indicated that history of heart attack and success of the procedure were correlated, an interaction variable was constructed to represent this relationship. In addition, variables representing interactions between coping style-information mis-

match, success of procedure, age, history of heart attack, and angina class were calculated, since the correlation matrix from the first logistic regression indicated that there were moderate relationships between these variables. These variables were entered into a logistic regression and produced an equation which fit the data and produced a number of significant findings. See Table 7 for a presentation of these results. Three variables which did not involve interactions reached traditional levels of significance, indicating that patients with multivessel disease, no history of heart attack, and lower angina class were more likely to have restenosis during the 6 months after the procedure. The other non-interaction variables which did not reach traditional significance level but which did have a large ratio between their regression coefficients and standard errors suggest that patients who are older and are males are more likely to have restenosis during the six months after P.T.C.A. With the exception of the finding for angina class, this profile matches the findings of other research on restenosis. It is not clear why patients with lower angina class had more restenosis. This could correspond to other research which suggests that patients with more recent diagnosis of coronary disease have higher rates of restenosis. However, one would expect that for these new patients the duration of their symptoms should be short, which is not the case in this study. If it can be assumed that patients

with more recent diagnoses should also have a shorter duration of symptoms, then the weak relationship between symptom duration and restenosis does not support the speculation that the finding for angina class is explained by more recently diagnosed coronary disease. The psychological variable describing the match or mismatch between coping style and information level had a regression coefficient suggesting that patients with a coping style-information mismatch were more likely to have restenosis, although this variable and angina class were involved in substantial interactions with success of the procedure and history of heart attack, which were examined using Chi-square analyses.

Discrete variables representing success of the procedure, history of heart attack, angina class, and style-information match were used in Chi-square analyses to further explore the some of the interactions used in the logistic regression analyses. A 3-level success of procedure variable was constructed from the continuous measure of success of the procedure used previously. These levels reflected fair, moderate and excellent procedural outcomes. All patients who had unsuccessful procedures or who had coronary artery bypass surgery after P.T.C.A. had already been eliminated. Angina class was measured using a 4-level variable representing the four classes of angina, from the least severe (Class I) to the most severe (Class IV). It should be noted, however, that 94% of the sample had either Class II

TABLE 7

Logistic Regression Results for Restenosis

Variable Code	REGRESSION COEFF.	STANDARD ERROR	COEFF. /S.E.	p-VALUE
AGE	.19012	.20408	.93157	--
MIHIS	-16.99723	8.87888	-1.91434	--
NWART	1.25154	.48021	2.60623	.05
ANGCLS	-5.23355	2.44052	-2.14444	.05
PROCSUC	.17700	.92434	.19149	--
AGANG	.07603	.04057	1.87389	--
PROCAG	-.02904	.01370	-2.11995	.05
MATPROC	.33851	.23355	1.44943	--
SEX	-1.42867	.77676	-1.83928	--
NEWMATCH	-4.82465	3.90311	-1.23610	--
MIPROC	1.08045	.50559	2.13703	.05
MIMAT	2.78443	2.36567	1.17702	--
TRIMAT	-.22128	.14499	-1.52622	--
SYMPDUR	.05025	.15486	.32447	--
MIAGE	.04369	.04850	.90080	--

GOODNESS-OF-FIT   CHI SQUARE = 64.485   DF=53   P=.134

Key for Variable Codes:
MIHIS = History of heart attack
NWART = Number of vessels occluded
ANGCLS = Angina Class
PROCSUC = Success of the procedure
AGANG = Interaction of angina class and age
MATPROC = Interaction of coping style-information
            match and success of the procedure
NEWMATCH = Style-information match
MIPROC = Interaction of history of heart attack and
            success of the procedure
MIMAT = Interaction of history of heart attack and
            style-information match
TRIMAT = Interaction of MIHIS, PROCSUC and NEWMATCH
SYMDUR = Duration of symptoms
MIAGE = Interaction of history of heart attack and age

or III angina. Coping style-information match was con-

structed as a 5-level variable representing the following combinations: 1) coping style-information mismatch repressors; 2) coping style-information mismatch sensitizers; 3) coping style-information match repressors; 4) coping style-information match sensitizers; and 5) low anxious group not separated by information level. A dichotomous variable representing the presence or absence of heart attack was used to represent that dimension. Chi-square analyses revealed that patients with Class II angina were more likely to have restenosis at fair levels of success of the procedure, while patients with Class III angina at that level of procedural success had no relapses (see Table 8). There were no differences between angina groups at moderate or excellent levels of procedural success. This analysis suggests a possible explanation as to why lower angina class was related to higher rates of restenosis in the logistic regression analyses. Perhaps patients who left the hospital having only fair procedural success and less severe angina may have perceived that they should have been able to do more activities, since they were not limited by extreme angina. They may have not made vigorous efforts to follow medication, dietary and exercise recommendations. Because their condition was compromised in that they did not have excellent procedural outcomes, their physical status may have deteriorated quite rapidly, leading to quicker restenosis.

TABLE 8

Angina Class at Levels of Procedural Success

Level of Success of the Procedure = Fair

Angina Class	No Restenosis	Restenosis
II	1	6
III	10	0

Fisher's Exact Test   p<.001

Analyses of the coping style-information match variable demonstrated that it was highly associated with levels of restenosis at moderate levels of procedural success, regardless of whether the patient had a history of heart attack (See Table 9). There were no differences in restenosis rates for coping style-information match groups at fair and excellent levels of procedural success.

These results suggest that sensitizers with a mismatch between their coping style and information level (i.e., low levels of procedural and risk factor knowledge) have espe-

TABLE 9

Coping Style-Information Match Versus Restenosis

Level of Success of the Procedure = Moderate

Style-Information Groups	No Restenosis	Restenosis
Repression Match	2	2
Repression Mismatch	1	3
Sensitzation Match	11	4
Sensitization Mismatch	1	6
Low Anxious Group	7	1

Chi-Square = 11.68 D.F.=4 p<.01

cially high rates of restenosis at moderate levels of procedural success, while sensitizers with a match between information level and their coping style have better outcomes. The low anxious group has an extremely low rate of restenosis at moderate levels of procedural success. These findings parallel the results of Shaw and associates (in press) and Cromwell and associates (1977).

Considered together, the Chi-square analyses suggest that history of heart attack exerts influence uniformly across levels of procedural success, whereas the coping style-information match variable is significant only at moderate levels of procedural success, and angina class at fair levels of procedural success. Procedures which are rated as excellent in their success are not affected by these two variables, suggesting that at this level success of the procedure is the primary determinant of restenosis outcome. These results provide partial support for Hypothesis D.1, although the interactions between psychological and medical variables present a more complicated situation than originally expected.

6-month Complication Outcomes

The same variables which were included in the Chi-square analyses previously described were used to examine their relationship to occurrence of complications during the six months after P.T.C.A. Fifteen percent of the patients who had a successful procedure experienced one complication (hospitalization for chest pain, heart attack, arrythmias) which was reported by their physician at the 6-month medical follow-up. In a logistic regression analysis, no variables reached traditional levels of significance, although substantial ratios between regression coefficients and standard errors were found for duration of symptoms, success of the

procedure, age, and the interaction between history of heart attack and coping style-information match. The direction of the regression coefficients for the non-interaction variables suggested that patients who are younger, with a shorter duration of symptoms and less successful procedures tended to have more complications during the six months after P.T.C.A.

Chi-square analyses were used to examine the interaction between history of heart attack and coping style-information match. These analyses demonstrated that the coping style-information match variable was significantly associated with occurrence of complications, and this significance was primarily accounted for in the patient group that had no history of heart attack. More specifically, these analyses revealed that repressors who had a mismatch between coping style and information level accounted for most of the occurrences of complications, while for both repressors with a match between style and information and the group of low anxious patients, complications rarely occurred. Coping style-information mismatch was not associated with complications in the sensitizer groups (see Table 10). These findings parallel those of Shaw and associates (in press) and provide partial support for Hypothesis D.2. Again, interactions between the psychological and medical variables present a more complicated situation than originally expected.

TABLE 10

Style-Information Match Versus Complications

Status for History of Heart Attack = No Heart Attack

	No Complications	Complications
Style-Information Groups		
Repression Match	5	1
Repression Mismatch	1	4
Sensitzation Match	10	2
Sensitization Mismatch	6	1
Low Anxious Group	9	0

Chi-Square = 13.50   D.F.=4   p<.001

6-month Social Functioning and Mood Disturbance

Since level of scoial functioning and mood disturbance as-
sessed at six months were both measured as continuous vari-
ables, Analysis of Variance (ANOVA) and Multiple Regression
Correlation were used to examine the relationship of psycho-
social, information and medical factors to these outcomes.

The power of these analyses was reduced because some patients did not complete all of the questionnaires which were sent to them, which reduced the amount of data available. In the social functioning analyses, complete information was available on only 47 of the 78 patients who returned the 6-month follow-ups. All of the demographic and medical variables described in the previous regressions were used in these analyses, along with the psychosocial variables and the style-information match groupings. MRC analyses demonstrated that state anxiety the night before the procedure was the only variable significantly related to level of social functioning at 6 months after the procedure (F = 5.61; p<.03; sr = -.54), suggesting that more highly anxious patients had poorer social functioning levels. This model accounted for 66% of the variance in social functioning outcome. Since including all the interactions between independent variables significantly reduced the number of degrees of freedom in the error term, an ANOVA using success of procedure as a covariate and entering only the major psychosocial variables was performed to confirm the regression findings. These analyses paralleled the findings in the MRC analysis. These results provide partial support for Hypothesis E.2, since coping style-information match was expected to be more strongly related to social functioning than anxiety during hospitalization.

For the analyses of mood disturbance at 6 months, data were available on 55 of the 78 possible patients. ANOVA analyses demonstrated that anxiety the night before the procedure and number of arteries occluded were significantly related to level of mood disturbance (F = 7.64, p<.01 for anxiety and F = 8.77, p<.01 for number of arteries), suggesting that patients with more anxiety the night before the procedure and with more arteries occluded tended to have more mood disturbance 6 months after their P.T.C.A. Again, these results provide partial support for Hypothesis E.2.

6-month Return to Work Outcomes

For the analyses of return to work and work efficiency, there were valid data on only 31 patients who were employed before their P.T.C.A. procedure. Because of this small sample size, it was impossible to examine all of the medical, psychosocial and information factors. Using success of the procedure as a covariate, grouping variables representing age, social support network, arteries occluded, history of heart attack, state anxiety and style-information match were entered as main effect in an ANOVA procedure. None of the variables were significant in analyses of return to work or level of work efficiency reported by patients. These results provide no support for Hypotheses E.1, E.2, E.3 or E.4.

<u>Summary</u> <u>of</u> <u>Hypotheses</u> <u>Related</u> <u>to</u> <u>the</u> <u>Major</u> <u>Findings</u>

Table 11 has been constructed to provide the reader with a summary of the hypotheses, indicating which hypotheses were fully confirmed, partially supported or not confirmed by the findings presented in this chapter. Only one hypothesis was fully confirmed, six others were partially confirmed, and twelve received no support.

TABLE 11

Summary of Hypotheses Related to Results

Outcome Variable	Hypothesis Number	Fully Confirmed	Partially Confirmed	Not Confirmed
Information				
	A.1		X	
	A.2			X
	A.3	X		
	A.4			X
	A.5			X
	A.6			X
Success of Procedure				
	B.1			X
	B.2			X
	B.3			X
Anxiety				
	C.1			X
	C.2			X
	C.3		X	
	C.4		X	
Restenosis & Complications	D.1		X	
	D.2		X	
Functional				
	E.1			X
	E.2		X	
	E.3			X
	E.4			X

DISCUSSION

Overview

The results of this study suggest that psychological factors are important in predicting how much information patients will have about the P.T.C.A. procedure and coronary risk factors prior to admission into the hospital, how much they will learn during hospitalization, and how the interplay between coping style, information level and medical factors can be valuable in predicting functional status and occurrence of complications and restenosis six months after the procedure. More specifically, patients who were classified as vigilant on an episodic measure of coping and who had scores near the mean of a repression-sensitization measure of dispositional coping knew the most about the P.T.C.A. procedure and coronary risk factors upon admission to the hospital. Conversely, avoiders who also had scores near the mean of the repression-sensitization measure knew significantly less than any other coping group at hospital admission. During hospitalization repressors gained significantly less knowledge about the P.T.C.A. procedure and coronary artery disease risk factors compared to other coping groups. Individuals who were the least anxious after the procedure were those who were rated as more internal and who were more

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likely to believe that powerful others had control over their health. Patients who previously had heart attacks were more likely to have procedural outcomes that were less successful compared to patients who had no history of heart attacks.

During the six month period after the procedure, patients who were classified as repressors and who left the hospital with a level of P.T.C.A. information that was greater than the average patient (a coping style-information level mismatch) were more likely to have medical complications if they had no previous history of heart attacks. Patients who were classified as sensitizers and left the hospital with a level of information lower than the group average (also a mismatch), and who had P.T.C.A procedural outcomes which were only moderately successful tended to have significantly higher rates of restenosis (re-narrowing) of the coronary arteries which were treated. Patients who were classified as having lower (less severe) angina class and who had only fairly successful procedural outcomes tended to have higher rates of restenosis. Patients with smaller social support networks tended to be more anxious six months after the procedure. Patients who were more anxious the evening before the procedure were more likely to have poorer social functioning and more mood disturbance six months after the procedure. Patients with multivessel disease (more than one artery partially occluded) had more mood

disturbance at the 6 month follow-up. These findings provide at least partial support for seven of the original hypotheses (see Table 11), although the complexity of some of the significant interactions between psychological and medical factors related to six-month outcomes was not expected. The following sections will include a discussion of how the results related to these initial hypotheses, why some hypotheses were upheld aand others were not, and interpretations which explain these findings based on previous research. In addition, methodological issues in this study will be examined, and the theoretical implications and generalizability of these findings will be discussed. The chapter will conclude with a discussion of treatment approaches which might be used for P.T.C.A patients, and recommendations for future research.

Hypotheses Related to Information

Level of Information Upon Admission

The review of the literature suggested that patients who were categorized as vigilant on a situational measure of coping, who were more internal and viewed powerful others as having a large amount of control over their health would initially be more likely to have higher levels of knowledge about the P.T.C.A. procedure and coronary artery disease risk factors. The findings did confirm that vigilant patients had higher levels of knowledge than patients classi-

fied as avoiders, but also revealed a significant interaction between the situational and dispositional measures of coping used. That is, although there was a significant correlation between avoidance-vigilance ratings and the pretest measure of P.T.C.A. knowledge using the Pearson Correlation procedure, further analysis using Mulitple Regression Correlation revealed that the avoidance-vigilance measure interacted with the measure of repression-sensitization, and this interaction accounted for a significant amount of variance in the pretest P.T.C.A. knowledge score. A plot of this interaction demonstrated that the relationship between avoidance-vigilance and pretest knowledge was significant only if patients were in the middle group on the repression-sensitization coping measure. In other words, the prediction from the literature that avoiders would have the lowest level of information, that the middle group demonstrating both avoidance and vigilance would have more information than the avoiders, and that the vigilant group would have information levels higher than either of the other two groups was upheld, but only for individuals who were also categorized in the middle group on the repression-sensitization scale. Since most studies of coping have used either dispositional or episiodic measures of coping, or have used both but have not examined them together in statisical analyses such as multiple regression, the finding reported here represents a new level of complexity in coping research. Although it

would be expected that dispostional and episodic measures of coping should be moderately correlated, the correlation between the episodic avoidance-vigilance coping measure and the dispositional repression-sensitization measure used in this study was quite low (r = 0.07), which is consistent with other reports in the literature (Cohen & Lazarus, 1973, 1979; Shaw et al., in press). Perhaps episodic and dispositional measures of coping are sensitive to different characteristics of the individual and the situation. For example, one possible explanation for the findings reported in this study is that patients who do not demonstrate a definite dispositional coping preference (that is, they are in the middle rather than at the extremes of the repression-sensitization scale, tending to give a mixture of repressive or sensitizing responses to questions) may use vigilant or avoidant strategies when faced with a stressful situation, depending on the particular situation in which they are. Individuals with a stronger dispositional coping preference (at either extreme of the repression-sensitization scale) would tend to chose the strategy most consistent with their dispositional style, regardless of the nature of the stressful situation. That is, the power of their dispositional tendency would influence whether they would intensely seek or avoid information relevant to their condition, and would override situational factors. Perhaps individuals who do not show a dispositional preference for coping are more re-

sponsive to demand characteristics of the situation, maintaining a coping flexibility which allows them to invest greater amounts of energy towards using avoidance or vigilance, depending on their perception of the situation.

The finding that individuals who scored high on belief in powerful others knew less about cardiac risk factor knowledge upon admission for P.T.C.A. was not expected based on the hypothesis generated from the review of the literature. Previous research suggested that individuals with high PHLC scores should expose themselves to more opportunities to learn, and it would seem to follow from this that they would acquire higher levels of information. DeVellis and associates (1980) did report that individuals with high PHLC scores were more likely to expose themselves to information about their illness. However, it is unclear whether the researchers established whether those subjects actually knew more than individuals in the other groups. Perhaps individuals who score high on the PHLC scale are simply disposed towards exposing themselves to a variety of information sources, but are very selective about the kind of information they ultimately acquire. Applying this type of logic to the current research, one possible explanation for the finding in this study is that the individuals who more strongly believed that powerful others controlled their health may have felt it was unnecessary to learn about cardiac risk factors, since their primary focus was to find in-

formation leading them to the physician who could provide them with the best possible treatment for their condition. Thus, they were interested primarily in exposing themselves to information sources which would lead them to the best place for P.T.C.A. treatment. Once they had found that information, they were then willing to place themselves in the hands of "the experts." It would follow that these patients might not bother to explore additional knowledge about cardiac risk factors, since they had found the information which satisfied their initial need to seek information. In fact, this attitude was expressed by a number of patients in the interview, suggesting that their most intensive information seeking task was to find the best place in the world for treatment.

It is surprising that patients who were more internal did not have pretest P.T.C.A. information scores that were significantly higher than patients who were externals. It is only possible to speculate why significant findings did not emerge. Perhaps an internal orientation to control provides an inclination to seek information, but may not necessarily result in the actual gain of higher levels of knowledge. It could be that factors such as intelligence, coping style and the availability of resources (e.g., a medical library in the vicinity) for learning may modify the relationship between internality and level of information. It may also be that the MHLC is not the most appropriate measure of

control to use with patients who have a chronic illness. Since all of the questions in the MHLC are related to health issues, these components may in fact obscure some of the relationships which might have emerged in a non-health oriented questionnaire. That is, since illness is a reality for severely ill patients, their responses to the MHLC may reflect their struggle to deal with their illness, of which control may only be a small part. They may focus on the health-related content of the questions and miss the elements which are designed to tap beliefs about control. If this speculation is accurate, it suggests that the health oriented HLC and MHLC scales may be more useful in studying beliefs about control in populations that are not composed of seriously ill patients. The non-health locus of control scale (the I-E scale) may be the most appropriate scale to use with medical patients.

Knowledge Gain During Hospitalization

The finding that true repressors gained significantly less P.T.C.A. knowledge than low anxious patients corresponds to the findings of Shaw and associates (in press) and other research demonstrating similar relationships for non-medical subjects in cognitive tasks (Asendorpf & Scherer, 1983; Weinberger et al., 1979). The current study does differ from the research of Shaw et al. (in press) in that the greatest variance in knowledge scores in the current study occurred

for the total and procedural knowledge scores, whereas in the Shaw and associates research the greatest variance between groups was for risk factor knowledge. One possible explanation for the difference between these studies is the type of patient group used. Patients in the Shaw et al. study (in press) were hospitalized for acute myocardial infarction, whereas patients in the current study were voluntarily undergoing treatment for one or more partially occluded coronary arteries. From the perspective of the patient, the characteristics of each situation (the meaning of the event, the amount of lifestyle disruption, the amount of time spent in the hospital) probably differed significantly, making a direct comparison of the two studies difficult. Since the most intense issues in the current study involved the procedure and its risks, it is not surprising that the knowledge gain differences between the coping groups were significant in the procedural knowledge area. In the Shaw et al. study (in press), the most intense issues involved how patients would cope with returning to their disrupted lifestyles, and the meaning of the heart attack on their future. Many of these issues were contained in the risk factor education provided to these patients during their hospitalization.

In the analyses of factors affecting information gain, anxiety did not emerge as a significant predictor, nor was there an effect of social support on individuals with high

levels of anxiety which enhanced their cognitive performance. Both of these findings were expected based on the review of the literature. These inconsistent findings could be due to the fact that the current situation differs substantially from those reported in the literature. Although the task of learning for the P.T.C.A. procedure is surrounded with elements of anxiety, the major task is to assimilate a finite quantity of information. This type of task certainly differs from many of the problem-solving tasks studied in other research (e.g., mathematical and concept formation problems). In addition, the variance in information outcomes accounted for by the measures of anxiety may have been shared with demographic, psychological or medical variables (e.g., older, sicker patients may have had a tendency to be more anxious). Such interactions would have made it less likely that anxiety would emerge as a factor which explained a significant amount of variance in the information outcomes. It could be that the manner in which P.T.C.A. information is presented by staff members contains significant elements of "support," which would also obscure a major effect of anxiety on learning, and suppress any interactions that might occur between anxiety levels and social support.

Knowledge Level Six Months after Discharge

None of the psychological, social or medical variables were related to level of knowledge measured six months after the procedure. Few studies have measured knowledge levels in patients beyond a few weeks after discharge from the hospital. The only other study to measure knowledge at a point in time similar to that used in the current research was the study by Rahe et al. (1979), in which no significant relationships were found. One explanation for this could be that over time the number of intervening positive and negative psychological and social factors increase, diluting any variance that might be present, thus producing a "regression to the mean" in which there are minimal differences between subjects. Subject attrition may have also influenced the findings by reducing the power of statistical analyses used.

Hypotheses Related to Success of the Procedure

None of the psychosocial or informational factors were related to success of the procedure. The hypotheses stating that psychological and informational factors would influence procedural success were based on the speculation that patients who either knew less about the procedure, or who used repression to screen out anxiety provoking procedural information might encounter unexpected sensations or experiences during the procedure. Faced with this situation, they might

be expected to respond with elevated physiological reactivity which might lead to irregular heart function or vascular spasm. Such events could have compromised the success of the procedure. In this study, only history of heart attack was significantly related to success of the procedure, indicating that patients with a history of heart attack were more likely to have less successful procedures. It could have been that since success of the procedure was determined using very physiological parameters associated with the lesion (residual stenosis and pressure gradient), it was unlikely that psychological factors would exert enough influence to produce effects which would not be obscured by the powerful relationship between history of a heart attack and procedural outcome.

Hypotheses Related to Anxiety

Anxiety During Hospializtion

The finding that patients who were classified as more internal and those who expressed high levels of belief in powerful others had lower levels of anxiety after the procedure corresponds in part to the speculation of Wallston and Wallston (1982) that the "believers in control" should be best adapted to successfully dealing with the health care system. Unfortunately, the variable which was constructed to directly test the eight "profiles" described by Wallston and Wallston (1982) was not significant in ANOVA procedures which

were used to test the effect of grouping variables on the study outcomes. This lack of congruence could be due to the fact that dividing the sample into the eight groups left too few subjects in each group cell and reduced the power of the analysis. In fact, examination of the distribution of subjects among the eight levels of this variable revealed that very few subjects were classified as "believers in control," making it impossible to test the hypothesis of Wallston and Wallston (1982). Based on the current study, the data more strongly support the interpretation that IHLC and PHLC scales operate as two independent factors related to outcome, and do not necessarily comprise the "profile" described by Wallston and Wallston (1982). Considering each factor separately, studies from the literature would support an interpretation that internals would have good psychological outcomes (i.e., less anxiety) if they were given specific information about the procedure (Auerbach et al., 1976). Similarly, patients with a high level of belief in powerful others controlling their health might be expected to have lower levels of anxiety after the procedure, especially if they felt they were in "the best hands." Both are consistent with the findings of this study.

Anxiety Six Months after P.T.C.A.

The only factor related to anxiety at 6-months after the procedure was the total network dimension of the NSSQ, which is composed of the number of persons in the network, the duration of the relationships and frequency of contact. A possible interpretation could be that patients who had fewer people to turn to during the six months after the procedure became more anxious. Since medical status was accounted for, it does not appear that this finding is mediated by the medical condition of the patient, nor does it interact with measures of coping. Poorer psychological outcomes have been found in heart attack patients who have poorer social support systems (Gruen, 1975). It is surprising that the social support variables in the current study were not related to other 6 month outcomes such as level of social functioning, general mood disturbance, and return to work. It is possible that this lack of significant results may have been caused by the substantial number of patients (24) who either did not complete a social support questionnaire or failed to fill one out completely. This reduced the power of these variables in statistical analyses.

Hypotheses Related to Six-month Medical Outcomes

Complications

The review of the literature suggested that the strongest psychological factor which might be related to complications was the match or mismatch between coping style and level of information at discharge. The results of this study demonstrated that repressors with a level of P.T.C.A. knowledge higher than the mean at discharge (a mismatch between coping disposition and information level) experienced more complications over the six month period after the procedure if they did not have a history of heart attack. This is consistent with the findings reported by Cromwell and associates (1979) and Shaw and associates (in press). The current finding does differ from the results reported by Cromwell et al. and Shaw et al. in that the current finding emerged only for patients who did not have a history of heart attacks. It may have been that patients who previously had a heart attack had impaired cardiac function, making them vulnerable to complications during the six months after the procedure, and therefore diminishing the effect that psychological variables alone would have. Another explanation for this finding could be that regardless of the level of information about their condition at discharge, repressors need to constantly expend energy to repress anxious feelings that arise from the meaning associated with physical sensations such as chest pain and excessive fatigue. As they continue to re-

press anxiety associated with these symptoms, they fail to acknowledge their meaning and do not seek medical consultation which may avert a future complication such as hospitalization for severe chest pain or the occurrence of a heart attack. Patients who are repressors and who also have a high level of information about their condition (coping style-information level mismatch) may need to invest even more energy to successfully repress the anxiety associated with these symptoms, since they may intellectually know they are "warning signals" based on their accurate knowledge, but are reluctant to acknowledge them emotionally. This added thrust of overcoming not only the anxiety associated with the actual symptom, but the additional anxiety of knowing what the symptom might be related to, may have caused them to deeply submerge the awareness of the symptom. This makes it even more unlikely that the patient would have sought medical attention which might have averted the occurrence of a major complication. Repressors with lower levels of knowledge may not have repressed the anxiety associated with the symptom as deeply, and may have become aware of the necessity for treatment before the situation became critical. It is also possible to speculate why this finding was supported primarily for patients who had no history of heart attacks. These patients could have perceived that they were not really that sick to begin with, which provided them with additional motivation to repress the negative meaning of any

warning symptoms. Patient who had previously had heart at-
tacks may have been more willing to acknowledge these symp-
toms because they had experienced them before. These argu-
ments are supported by findings for sensitizers, who would
be expected to be extremely aware of the threatening aspects
of situations and respond quickly. In the current study,
sensitizers were found to have very few occurrences of com-
plications, providing support for the arguments presented
above. Their coping disposition may have led them to seek
treatment early, which would prevented them from experienc-
ing serious complications.

Restenosis

It was found in this study that sensitizers who left the
hospital with P.T.C.A. information levels below the mean and
had procedures which were only moderately successful were
more likely to have restenosis during the six months after
the procedure. Although it was hypothesized that a mismatch
between coping style and information level might be related
to restenosis, the study of Shaw and associates (in press)
would suggest that the relationship would more likely have
been true for repressors than for sensitizers. In that
study, a functional outcome (poorer social functioning) was
related to a mismatch between coping style and risk informa-
tion level in sensitizers. Another study has, however, re-
ported a relationship between sensitization and poor physi-

cal outcomes. Cromwell and associates (1977) reported that sensitizers were more likely to have heart attacks during the first three months after discharge from the hospital. A possible explanation for the finding reported in the current study is that these patients did not understand the recommendations given to them about what they needed to do to prevent restenosis, and how to react to signs which might indicate that their condition was not improving. Since these patients had procedures which were not completely successful, they may have encountered symptoms which indicated that they were not functioning at the optimum level they expected, an expectation that may have been based on their misinterpretation of the information they were given about their condition at discharge. They may have further complicated the situation by overreacting when they took actions which they thought would improve their health status, but in reality only aggravated and accelerated the deterioration of their condition.

Although it was not stated as an hypothesis, patients who were classified as having Class II angina and who had procedures which were only fairly successful had higher rates of restenosis than patients with similar procedural outcomes who were classified as having Class III (more serious) angina. A possible interpretation of this finding could be that these patients left the hospital with a more compromised physical status, and since they had experienced

milder symptoms, may have perceived that they did not need to monitor their activities, change their diets, or exercise and take the medications prescribed. These actions may have contributed to an accelerated worsening of their condition and hastened the occurrence of restenosis.

It is interesting to note that for both occurrence of complications and restenosis, only one patient categorized as low anxious had a negative outcome. It is possible that low anxious individuals react to situations in a balanced way, able to use the information they have to effectively cope with the circumstances presented by the situation. On the other hand, sensitizers who are underinformed (coping-information mismatch) may overreact to situations, whereas repressors who are overinformed (also a coping-information mismatch) may tend to underreact to situations. The low anxious individuals may differ from the other groups in that they are able to interpret and respond to situations in ways that lead to actions which prevent the worsening of their condition, regardless of whether they have had a poor medical history (heart attacks) or a less successful procedural outcome. It could be that these individuals do have physical risk factors (e.g., multivessel disease) which could eventually lead to restenosis, but their coping style may prolong the time required for these factors to manifest their effects. It would be interesting to follow such a group of P.T.C.A. patients for several years to determine if

their style averts the occurrence of restenosis, or simply lengthens the amount of time required for restenosis to occur.

Hypotheses Related to Six-month Functional Outcomes
Social Functioning and Mood Disturbance

The review of the literature suggested that perhaps some of the strongest findings in the current study should have been for the functional outcomes, such as the amount of mood disturbance, level of social functioning, return to work and work efficiency. The mismatch between coping style and information level was hypothesized to be one of the variables most likely to be related to these outcomes. Anxiety measured the evening before the procedure emerged as the only factor which predicted mood disturbance and poorer social functioning six months after the procedure. Patients who were more anxious on the evening before the procedure had poorer social functioning and more mood disturbance six months after the procedure. This finding is consistent with other studies of cardiac patients which have reported that higher levels of anxiety during hospitalization were associated with poorer psychological and social outcomes (Croog, Shapiro & Levine, 1971; Hinohara, 1970). A possible explanation for the finding of poorer social functioning is that patients who had high state anxiety the evening before the procedure were overly anxious about their physical condi-

tion, perhaps doubting that the procedure could really help them. These patients may have maintained this excessive concern about their condition even if they had a successful procedure and were reassured by the staff that they could begin returning to previous levels of social activity. This may have led to these patients unnecessarily curtailing their social functioning because they were fearful of upsetting their condition.

In contrast, the findings for mood disturbance indicate that both patients who were more anxious the evening before the procedure and those who had more serious illness (patients with multivessel disease) demonstrated more mood disturbance at six months. Since interactions between these variables were included in the analyses, the effects were independently related to the outcome and account for unique variance in mood disturbance. An explanation similar to the one offered for the relationship between anxiety and poorer social functioning may also apply to the finding relating anxiety to mood disturbance. Perhaps patients who were extremely anxious the evening before the procedure may have perceived that it did not alter their condition, unable to accept information about the success of the procedure or reassurrance from the staff. They continued to be overly concerned about their condition during the six months after the procedure, leading to their report of more mood disturbance at the 6-month follow-up. It is also quite possible

that what is being measured here is the tendency of these patients to express negative mood when given the opportunity, if high anxiety the evening before the procedure is accepted as a general expression of negative mood state. That is, patients who express high levels of mood disturbance at one point are more likely to express high levels of mood disturbance at a later point in time.

It is logical that patients who do have more serious disease would be more disturbed, since their functioning may be limited by the disease, leading to a poorer psychological outlook. In addition, since multivessel disease patients do have a higher rate of restenosis, the experience of deterioration in their condition may contribute significantly to mood disturbance.

It must be remembered, however, that all of the 6-month findings which are based on the patient questionnaire must be interpreted in light of the fact that nonresponders tended to be younger and had more successful procedures. Thus, the findings could portray the outcomes for this sample as being more negative than they actually were, since the younger patients with more successful procedures who were more likely to have good 6-month outcomes were underrepresented.

Return to Work and Work Efficiency

The review of the literature suggested that psychological status should be related to higher rates of return to work and increased work efficiency. The only study of return to work in angioplasty patients found that patients who were female and those who had chest pain reported lower rates of return to work (Holmes et al., 1984). No physical factors were related to return to work or perceived work efficiency in the current study, nor was sex related to these outcomes. Since there were so few women in the sample, it is not surprising that sex was not significantly related to return to work. In addition, there was a large proportion of missing data for the return to work and work efficiency questionnaire items. This problem may have been intensified by the fact that younger patients, whom one would expect were more likely to be working, comprised a predominant proportion of the 6-month nonresponder group. It is probable, therefore, that the lack of significant findings in this area was due to methodological problems rather than erroneous hypotheses.

General Methodological Issues

Two methodological issues emerged over the course of this study and during analysis of the data. Missing data on the NSSQ social support questionnaire and the 6-month patient questionnaire were problematic, limiting both the types of analyses which were possible and reducing confidence in the

6-month findings. Patients were hospitalized only a short period of time for the P.T.C.A. procedure (usually 3 days) and were kept extremely busy during their brief stay. Since it was crucial that patients complete the coping and anxiety measures before the procedure, it often happened that little time was available to complete the NSSQ the evening before the procedure. After the procedure, patients were required to have consults with staff and complete all medical testing, again leaving limited time to complete the questionnaire. A majority of patients who did not complete the NSSQ in the hospital and took it home did not return the questionnaire. Considering the length of time patients were hospitalized for P.T.C.A., it appears that they were required to complete an too many instruments. Future researchers need to consider these time constraints in planning realistic studies with P.T.C.A. patients.

The final consideration is a statistical issue. Since a large group of P.T.C.A. patients may either be assymptomatic or only have mild discomfort during the months after the procedure, many physicians are reluctant to perform a coronary angiogram six months after the procedure. As a result, the most common outcome information available for most patients is whether the coronary artery has restenosed or is patent. Information in this form (a dichotomous outcome measure) is adequate in deciding what treatment action needs to be taken. However, this tyoe of information is less ade-

quate from a statistical point of view. Using dichotomous variables as outcomes requires the use of statistical techniques which are less powerful than those available for continuous outcome measures. In addition, an enormous amount of data are collected during the initial P.T.C.A. procedure as continuous variables (percent stenosis, pressure gradient, balloon inflation pressure) which could be correlated with similar information gathered at significant points in time (6 months, 1 year, 2 years, 5 years) after the procedure. However, these data are available only if the patient has a coronary angiogram at these follow-ups. Since most of these extremely useful data are not uniformly available, it has significantly limited the types of statistical analyses which have been used in most P.T.C.A. studies reported to date. Although it would be more expensive for the patient and involve some additional risk, studies in which coronary angiograms are used to follow all patients would provide a more powerful situation in which to examine all of the psychological, informational and medical variables, and their interactions, in relationship to restenosis outcomes.

Theoretical Implications

Perhaps the most striking findings of this study concern the relationships of the coping style-information level mismatch and medical outcomes. Three studies have now confirmed this pattern (the present research, Cromwell et al., 1977 and

Shaw et al., in press) and other studies have reported find-
ings that amount of information level may have detrimental
effects depending on the coping style of the individual
(Shipley et al, 1978, 1979). It is still unclear how this
mismatch between coping style and information level can in-
fluence social and physiological outcomes. The current
study has suggested that this relationship is mediated by
perceptions that produce inaccurate or unrealistic assess-
ments of the world, leading to actions and reactions that
disturb psychological, social and physiological processes.
Clarification of the mechanisms involved is needed. On the
positive side, this research does identify individuals who
appear to have excellent outcomes regardless of their physi-
cal condition or social situation. This "low anxious" group
may reflect a coping disposition which buffers the individu-
al from a variety of internal and external stressors. Fur-
ther exploration of this group may provide important infor-
mation that will aid in the development of a comprehensive
theory of coping which includes not only an understanding of
why coping attempts fail, but also what makes certain coping
strategies successful.

Generalizability of the Findings

Since the setting for this research involved a majority of patients who were primarily referred from other health care providers, the sample may not be representative of the average patient who might undergo P.T.C.A. at a community hospital. Patients in this sample came from all over the United States and several foreign countries. Most were referred to this institute because the cardiologists who perform the procedure are internationally recognized as leaders in the field who have had success in performing P.T.C.A. on difficult cases. Since a majority of the sample was composed of patients with multivessel disease and difficult coronary lesions, the sample may not be representative of the average patient who is treated in nonspecialized medical centers, although the treatment of this tyoe of patient is becoming more common in specialized centers around the country. For the most part, patients had their own private insurance or were able to pay for the procedure themselves. Since many of the patients also had to pay for travel costs and accommodations for family members while in San Francisco, this sample as a whole is probably better off financially than the average patient receiving P.T.C.A. treatment in a nonspecialized community hospital setting.

The information gain findings are probably generalizable to most heart patients who have either had heart attacks or undergone coronary bypass surgery, but may not generalize

to other types of cardiac illness (e.g., heart failure, tachycardia) which are more chronic in nature. The information findings may relate to patients who are undergoing stressful medical procedures, although their generalizability to studies of general surgery patients is not clearly established.

Implications for the Treatment of P.T.C.A. Patients

This study does suggest that psychosocial factors need to be considered when planning education and interventions with P.T.C.A. patients. The results presented here would suggest that repressors be given only minimal information and preparation for the procedure, and simple principles for guidance during the posthospital recovery period. On the other hand, sensitizers need to be given detailed information about the procedure and coronary artery disease risk factors, and their level of understanding needs to be monitored frequently. Patients who are extremely anxious the night before the procedure need extra attention and follow-up to insure that they have a realistic appraisal of their actual medical condition and what they are capable of doing. And finally, repressors with mismatch between style and information level need specialized follow-up involving more frequent medical consults to identify emerging symptoms which may be precursors of future complications. Sensitizers with a mismatch between style and information need specialized rehabilita-

tion follow-ups which focus on accurate information and techniques (e.g., role playing) which may assist them in more effectively dealing with situations they encounter during their recovery.

Future Research

More research is needed to further clarify the relationship between psychological, informational and medical factors in patients undergoing P.T.C.A. Since continued advances in P.T.C.A. are making it a viable alternative for more patients who otherwise would have had coronary bypass surgery, it is important to understand the factors which lead to more successful procedures and better longterm outcomes. The current research suggests that an intervention study is necessary to determine if the relationships reported here can be modified so that negative psychosocial and medical outcomes can be reduced in these patients. Such a study would involve random assignment of patients based on their coping dispositions into groups in which the level of information is experimentally manipulated. Unfortunately, since many of the medical outcomes considered occur in a minority of patients undergong P.T.C.A., a fairly large sample would be necessary to execute such a study. Perhaps the only practical way to mount such a project would be to coordinate it with a medical study in which the 6-month outcomes were determined using angiographic findings. This would increase

the power of the statistical analyses used and allow the research to be accomplished in a reasonable amount of time with fewer patients needed. Such a study could validate therapeutic techniques which would lead to more effective treatment of P.T.C.A. patients, improving their medical and functional outcomes, and reducing health care costs.

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Appendix A

A/V INTERVIEW

1) If you had to briefly describe to someone why you are having this angioplasty procedure, what would you say?

2) What do you think has led to you having this trouble with your coronary arteries?
- (If patient mentions all lifestyle factors, ask about heredity, or vise versa)

3) What exactly did your referring cardiologist tell you about your medical condition that led to you coming here for an angioplasty?

       a. Did your referring cardiologist tell you anything about how the procedure itself would be performed?

       b. What kinds of things did he or she tell you?

       c. Did you discuss this with any other medical personnel?

       d. With any friends, neighbors or coworkers?

       e. What did you talk about?

       f. What do you expect this procedure to accomplish for you, in your particular case?

4) Did your doctor discuss any other treatment options with you?

       - If yes, what were those options?

       - Why did you choose to have angioplasty?

5) When your doctor first told you that you needed to have some kind of treatment for the blockage in your coronary artery(s), what was your first reaction?

6) Now, when you think about having the angioplasty tomorrow, what thoughts or feelings do you have about it?

       a. Are there particular things about the procedure or your hospital stay that are troubling to you?

       b. How do you deal with the feelings you have about it?

c. Do you ever try not thinking about it?

7) I'd like you to tell me what you think will happen tomorrow, starting from the time you wake up in the morning until you return to your room after the procedure, as far as the routine you will go through, and things like that.

    a. Do you think you'll feel any discomfort during the procedure?

    b. How do you think you'll feel after you return to your room from the procedure?

8) Did you read anything about this procedure before coming here to the hospital? If so, what?

9) How much information do you believe you have about the angioplasty and what will happen while you are in the hospital?

    a. If I asked you to rate the amount of information you have, with 1 being that you know absolutely nothing, and 10 being that you know everything you could know about the procedure where would you put yourself on the scale from 1 to 10?

    b. Is this enough information for you?

    c. Are there other kinds of things that that you can think of that you would like to know about? any particular questions you have right now?

    d. Do you feel at all like you have been given too much information?

10) Who is the cardiologist who is going to perform your angioplasty?

    - Have you met with him?

    - How did you feel about your visit with him?

11) Did anyone come with you here to the hospital? Who?

    a. Does this person plan to be here at the hospital tomorrow while you are having the angioplasty done?

    b. Have you discussed your thoughts and feelings about the procedure with this person?

    c. What does he or she think about it?

12) How are you feeling right now?

    a. Are you worried about what will happen tomorrow?

b. What is it that concerns you?

13) Are you currently employed? What do you do?

a. Is your job stressful?

b. If I asked you to rate the stressfulness of your job
on a scale of 1 to 10, with 1 being not at all
stressful, and 10 being extremely stressful, how would
you rate your job?

c. Are you satisfied with your current job?

d. If I asked you to also rate how satisfied you are with
your job on a scale from 1 to 10, with 1 being very
dissatisfied, and 10 being extremely satisfied, how
would you rate your current job?

14) I'd like you to imagine what your life is going to be like
when you leave the hospital, especially in terms of your work,
your diet, your level of activity, things you can do and can't do.

a. Do you think that after you leave the hospital that
things in your life are going to be different than
they were before you came here? how?

15) Do you expect that you will ever have to have this procedure
again?

Appendix B

A/V CODE BOOK

This coding manual is based on the interview developed by Shaw and Cohen to assess avoidance-vigilance in patients undergoing Percutaneous Transluminal Coronary Angioplasty (PTCA). Aviodance-vigilance is a construct describing the degree to which people avoid or are vigilant towards information. As it is used here, it is an episodic measure rather than a trait measure. It represents a continuum along which people may be categorized, ranging from the avoidance end, described by a reluctance to pursue and use information, to the vigilant end, described by actions which seek and utilize information. This manual is divided into three major sections: 1) Information seeking, 2) Acknowledgement or avoidance of emotional components, and 3) Information accuracy and completeness. Each major area contains coding items which refer to specific questions in the PTCA interview. Section 1 contains 6 items, section 2 contains 8 items, and section 3 contains 10 items, for a total of 24 items. The PTCA interview has 15 major questions, with many questions containing probes for additional information (See PTCA Interview). Two of the interview questions, 9a and 13, are not coded as part of the avoidance-vigilance dimension, and were used for other purposes in our study. Note that the coding items in this manual are arranged in order by the 3 major theoretical sections listed above. The interview questions, however, were arranged to facilitate getting information from the patient in a logical, chronological way. To assist the coder in overcoming this mismatch, we have developed a scoring sheet to be used with this manual (See the scoring sheet included). The scoring sheet includes patient identifier information and a place for the total score at the top. Next you will find 2 large vertical sections, each divided into 3 identical columns. The first column in each half contains the coding item number, which corresponds to the number of the item used in this scoring manual. A line in included after this where the actual score will be recorded. The next column gives the range of values the particular item may take. The last column refers to the number(s) of the interview question(s) which should contain the content material needed to code the particular item. To facilitate scoring the interview directly from the tape, the coding items have been arranged in the order in which they appear in the interview. This is contained in the box at the right marked "item order". We have found that it is possible to score directly from the taped interview by following this item order scheme. The item order is reproduced below with a few additional notes which may help during the coding:

```
                        18
                        16
                         1
                         2
                         7
                        17
                         8
                         9
                        10
                        24
                        ----> now score the procedural components
                        12
                        ----> now stop the tape and look back over
                              the first seven questions and score
                              item 13
                         4
                         5
                        22
                        15
                         3
                        11
                         6
                        14
                        23
                        ----> now calculate the totals for items
                              19 and 20

                        score item 21 based on what you marked when
                        going through the procedural components
```

Next on the scoring sheet you will find a section called Scoring for procedural components. These refer to items 19, 20 and 21. This section contains the 20 key elements of knowledge for this procedure. Beside each number is a "key word" which is provided so that once the coder is familiar with the items, it is not necessary to continually refer back to the scoring manual. There is a line be each item for a checkmark. The "A" and "I" refer to whether the information was Accurate or Inaccurate. MIN refers to whether the information element is a Minor element, or a major element (MAJ). These are all explained in detail in the scoring manual. The bottom section contains the final scoring, which is described below.

Scoring: for each section may range from 0 to 12 for section 1, 0 to 18 for section 2, and 0 to 48 for section 3. The final score is not a simple total of the 3 sections, but a weighted score reflecting the theoretical importance of each section. Section 2, Acknowledgement or avoidance of emotional content, comprises one-half of the final score. These items are added together and not altered. Sections 1 and 3, Information Seeking and Information Accuracy and Completeness, together make up the other half of the final score. However, the total from these two sections is not used, but a weighted score is derived.

Theoretically, Information Accuracy and Completeness (Section 3) is twice as important as Information seeking (Section 1). However, Section 3 has 4 times as many points as Section 1. To equate these so that Section 3 is 2 times the value of Section 1, it is first necessary to multiply the score from Section 1 by 2. Then total scores from sections 1 and 3 are added together and multiplied by .25, rounding off to the next highest integer if the fraction is greater than .5. This last multiplication weights sections 1 and 3 in relationship to Section 2. For example, if a patient got a score of 18 on section 2, and scores of 12 and 48 respectively on sections 1 and 3, the final score would be 18 + .25 (2(12) +48) = 36, which is the highest score possible for this scale. Note that you must first multiply 2 times the Section 1 score, then add that to the Section 3 score, multiply that total by .25, and then add the result to the Section 2 score. Overall, lower scores indicate a tendency towards avoidance, while larger numbers indicate vigilance.

This coding scheme is designed to be used with audiotapes, or a combination of audiotapes with transcipts or notes of the interview. Since a number of the coding items are based on specific information, it is best for the coder to become thoroughly familiar with the manual before attempting to code interviews. From our experience we have found that most of the content for coding will be in the interview questions indicated, although it does happen that patients will relate codable material in response to questions other than the ones we have indicated. This is especially true for the procedural components questions. In light of this, it is helpful to make some notes about particular items as you are listening to the tape to facilitate coding later items. To further assist the coder, the manual has been set up so that each coding item is on a separate page, with the number of the coding item at both the top and the bottom of the page.

Information Seeking

1. Did the patients talk with medical personnel about the procedure and/or their condition?

Refer to PTCA Interview question 3c, noting whether patients indicate that they talked with medical personnel, paying special attention to physicians other than their referring cardiologist or their primary care physician (GP or family practice). Patients may also mention talking to non-physician medical personnel, such as nurses or tehnicians. Patients who talk with several medical personnel either to seek information about their treatment and/or condition, or to gain more information and/or confidence about the angioplasty procedure, would be scored higher on this dimension. Note that this refers to information that was sought before patients enter the hospital for PTCA, as many will mention that they have talked to other medical personnel since they came into the hospital for the current procedure, but add that those medical people are part of the staff at Seton Medical Center. The key issue here is whether patients sought out information about the procedure beyond that which was presented to them by the referring cardiologist as normal procedure. Occasionally it will happen that patients are hospitalized somewhere else, the blockage is discovered, and they are immediately transferred to Seton for a PTCA. Because of this short time, it may be difficult for patients to talk with very many medical people, as well as friends, neighbors or coworkers. In this case, it is best to assume a score of 1 on this variable (that is, an average score) unless there is evidence that the patient did make unusual efforts to make medical contacts before coming. If the medical person the patient talks with is a relative, try to determine who made the contact. If it appears that the patient did initiate the contact score a 2 for this variable.

Scoring

Patients talked only with referring cardiologist
and/or primary physician and appeared to
have listened more than engaged in an active
discussion about their condition   =   0

Patients actively discussed medical issues,
but only with their referring cardiologist
and/or primary physician   =   1

Patients actively sought out medical personnel
other than referring cardiologist and/or
primary physician for information   =   2

2. Did patients discuss the procedure with friends, neighbors and/or coworkers?

Refer to PTCA Interview question 3d. Note whether patients

mentioned that they talked with friends, neighbors and/or coworkers, paying close attention to who initiated the contacts. If it appears that patients initiated the contact to seek information (asking others if they had heard of the procedure, if they knew of someone who had had it, etc.), then the person would tend to score higher on this variable. If it is impossible to determine that, or it appears that more often others approached the patient about the procedure (e.g., if the patient says "Everyone at work was curious where I was going, so I finally told them that I was going to the hospital for some procedure - I didn't go into any details."), score this as a 1 (an average score).

Scoring

> Patients do not talk with friends, neighbors
> or coworkers about the procedure   =   0
>
> Patients do talk with others, but appear
> not to have initiated the discussion   =   1
>
> Patients do talk with others, and
> initiate the discussion   =   2

3. Did patients discuss the procedure with family members?

Refer to PTCA Interview question 11, noting whether patients state that they have talked with family members about their thoughts and feelings about the procedure. Most patients will say that they have discussed their thoughts and feelings about the procedure with their families, but some will not elaborate very much on what they talked about, or mention that their family thinks it is a wonderful procedure and that all will work out well. Others will mention that they have discussed fears about the procedure with their family, the possible implications of what would happen if the procedure were not successful or that they might not pull through it. This content would lead to a higher score on this item. If patients have no family or they are not brought to the hospital by anyone, it is sometimes difficult to score this item. In those cases, give a score of 1 (an average score).

Scoring

> Patients did not talk with family members
> about their thoughts and feelings about the
> procedure   =   0
>
> Patients did talk with family about their
> thoughts and feelings about the procedure,
> but do not mention discussing anything beyond
> the technical aspects of the procedure and

may emphacise that family members are more
concerned than they are, or stress that
everyone insists that all will go well   =   1

Patients did discuss thoughts and feeelings
with their families and mention that unpleasant
as well as pleasant outcomes, uncertainties,
and implications of the procedure
were discussed   =   2

4. Did patient read about the procedure before coming to the
hospital?

Refer to PTCA Interview question 8, noting whether patients
indicate that they have read about the procedure before coming
into the hospital. Note that often patients will answer this
question yes, but relate that they read the booklet which is
given to them when they arrive at Seton. This does not qualify
as a positive score for this item. Sometimes patients will say
that they did seek out general information about heart disease,
heart attacks, or read booklets about angiograms. Since it is
difficult to determine to what extent these include information
specifically about PTCA, it is best to give patients a score of 1
if they do mention things like this. Also give patients a score
of 1 if they mentioned that they watched a TV program about
angioplasty. Some will mention that they saw things such as open
heart surgery on TV, but unless it appears to relate to the
current procedure, do not score this. As with the other items in
this section, be aware of whether it appears that patients
actively went out seeking this information, or were simply the
passive recipients of it (e.g., my brother sent me an article
about the procedure).

Scoring

Patients have not read anything about the
procedure before coming to the hospital   =   0

Patients indicate that they did read about
the procedure or see something on TV about
it, but they appear to have not sought this
out on their own   =   1

Patients indicate that they did read about
the procedure or see something on TV, and
appear to have made efforts in seeking out
this information   =   2

5. Did patients have questions about the procedure or what would
be happening to them during or after the time they were in the
hospital?

Refer to PTCA Interview question 9, especially 9c, and also note any responses that occur in question 14. Patients will usually state whether they have questions when asked directly in part 9c. The major areas in which they might have questions are about the actual procedure, the recovery period immediately following the procedure, the preparation they will receive about diet, exercise before they leave the hospital, or things they can do and can't do after discharge. An important distinction between level 0 and 1 is whether patients admit that there is probably more that can be learned. In other words, some patients may say that they have no questions and are satisfied with what they know. They would be given a 0 for this item. Others may say they are satisfied and may also not have any questions, but they may state that there is probably more to know than they actually know. These patients would be given a score of 1.

Scoring

Patients say they have no questions and/or
say they are satisfied with what they know   = 0

Patients may say they have questions, but are
unable to articulate any specific questions
or identify areas of concern, or they
may say that they have no questions but state
there is probably more to know than they
actually know   = 1

Patients say they have questions and are
able to articulate them, having questions
about one or more of the major areas, or
specific questions in one area   = 2

6. Can patients identify areas for lifestyle modification after discharge and do they have a concept of what is involved in changing behaviors in these areas?

Refer to PTCA Interview Question 14. As far as specific changes for most patients after discharge, it is recommended that patients decrease dietary fat and quantity of food, quit smoking, increase physical activity, and modify work hours if it appears that work is a high stress siutation. Note whether patients are aware of these areas, and if so, whether it appears that they know what needs to be done. It sometimes does occur that patients had to make lifestyle changes before the PTCA, often occurring if they had a heart attack or long history of coronary problems. In these cases note whether the patients know that they must continue these changes. The major point here is that PTCA does not cure the underlying coronary disease, and it is necessary for patients to be conscious of things they need to do to improve their chances of slowing down the disease.

Scoring

Patients state that no life style
changes are necessary   =   0

Patients state that there may be some changes
necessary in their lifestyle, but appear
to have not thought much about this, having an
inadequate understanding of what is involved
or appearing to be disinterested or not
motivated to know more about these changes   =   1

Patients state that lifestyle changes are
necessary, and can describe what they are
appear to have given them some thought   =   2

Acknowledgement or Avoidance of Emotional Content

7. Did patients discuss the non-technical aspects (emotional reactions, feelings about outcomes and experience of the procedure rather than how the procedure will be done) of the procedure with friends, neighbors and/or coworkers?

Refer to PTCA Interview question 3e. Note whether patients mentioned that they talked with friends, neighbors or coworkers not only about how the procedure would be done, but also discussed feelings about the procedure, expectations about what would happen, possibility of pain or of things going wrong, and other things related to the potential emotional outcomes of the procedure or its effect on the lives of the patients.

    Patients appear to have not talked about
    non-technical aspects of the procedure with
    friends, neighbors or coworkers   = 0

    Patients may have talked about some of the
    non-technical aspects of the procedure,
    but answer in a way that they tend to emphacise
    the technical aspects more, or focus on
    friend's responses that there is nothing to
    worry about and that the procedure
    would go fine   = 1

    Patients did talk about non-technical
    aspects of the procedeure, and relate
    positive and/or negative emotional issues
    discussed during their meeting with others   = 2

8. What was the patient's initial reaction to the diagnosis?

Refer to PTCA Interview question 5. Note how the patient describes the initial situation, the types of emotions, if any, which are described, the meaning of the reaction (e.g., "I was upset because I realized that I had a serious disease"), and the kinds of words used to relate the intensity of the emotions. If the patient describes a reaction in a matter-of-fact way (e.g., "When I heard the diagnosis my first reaction was 'Let's get on with it'), this would tend to push the patient in the direction of a lower score for this item.

    Patients say that they had no reaction,
    or describe the reaction they had in a
    very matter-of-fact way, or downplay the
    reaction with light comments or laughter   = 0

    Patients indicate that they reacted with
    one or more major emotion(s) (surprise,
    shock, relief to know, etc.), but do not

describe these in very much detail, and
may downplay their reaction, or not
talk about the meaning of the reaction
or the intensity of the emotion, or the
actions or processes that may have emerged
from this reaction   = 1

Patients indicate that they reacted with
1 or more major emotions or feelings, and are
able to discuss the intensity of the
feelings, or talk about the meaning of the
reaction , the actions or processes
that may have emerged from this reaction   = 2

9. Do patients admit to there being troubling aspects to the procedure?

Refer to PTCA Interview question 6a. For this coding, simply note whether the patients indicate that there are some troubling aspects to the procedure.

Patients say that there are no aspects
of the procedure that are at all
troubling to them, emphacising the
positive aspects   = 0

Patients admit that there may be 1 or 2
aspects of the procedure that are troubling
them, or may admit general fear or
nervousness, but again tend to downplay
these and emphacise the positive aspects
or skills of the doctors   = 1

Patients admit that there may be 1 or 2
aspects of the procedure that are troubling
them, or may admit general fear, anxiety or
nervousness, but do not downplay these   = 2

Patients admit that there are a number of
aspects (3 or more) related to the
procedure that are troubling to them,
and do not downplay most of them, although
they may say that some are not as
troubling as others   = 3

10. Do patients indicate that they try to not think about the procedure or consciously put it out of their minds?

Refer to PTCA Interview question 6c. For this coding, simply note whether the patients indicate that they do try to not think about the procedure, or find themselves consciously putting the

procedure out of their minds. Give a 1 (an average score) if it is unclear what the patient did, or if the question is not asked.

> Patients say that they frequently (3 or more
> times or an expression that it happens
> quite often) find themselves trying
> not to think about the procedure and
> do try to consciously put it out of their
> minds   = 0
>
> Patients say that on occasion (1 or 2 times)
> they find themselves trying to not think about
> the procedure or consciously put it out of their
> minds, or just don't think about it too
> much   = 1
>
> Patients say that they never find themselves
> trying not to think about the procedure and
> never try to consciously put it out
> of their minds   = 2

11. Do patients state that they are worried at all about the procedure and what will be happening to them?

Refer to PTCA Interview questions 12a and 11c. Note whether the patients indicate that they are worried about the procedure. Often patients will say that they are not exactly worried about it, but that they are concerned. This can usually be interpreted as a mild form of worrying. Patients will sometimes make broader statments about worry, debunking it by saying that worry doesn't help any, that it is foolish to be worried, or may indirectly debunk worry by making fatalistic statements or using cliches when asked if they are worried (e.g., "What will be will be"). Statements like this tend to push someone towards a lower score for this item. Patients also sometimes make statements such as "If anybody says they are not worried, they are lying" but do not clearly admit that they themselves are worried. Score such a response as a 1.

Scoring

> Patients deny that they are worried, and
> make statements that debunk worry, or use
> cliches to describe their feelings   = 0
>
> Patients state that they are not worried,
> but do not make statements that debunk
> worry, or use cliches to describe their
> feelings   = 1
>
> Patients say that they are not worried,
> or perhaps only slightly worried,

indicating that they are somewhat
concerned about what will happen, or
stating that they feel a little
apprehensive or nervous   =   2

Patients indicate that they are worried about
the procedure without diminishing their worry
with qualifiers (a little, slightly) or
describing themselves as merely apprehensive
or concerned   =   3

12. Do patients expect that there will be some discomfort during
the angioplasty procedure or afterwards?

Refer to PTCA Interview questions 7a and 7b.   Note whether the
patients indicate that they expect there will be pain or
discomfort during the procedure.   Sometimes patients will say
that they don't think they will experience pain because they
didn't have pain during their angiogram. Since patients are told
that there may be some pain when the balloon is expanded, always
look at their entire response before making a coding judgment.
That is, a patient may say that he or she didn't experience pain
during the angiogram, but realizes that he or she has been told
that there may be some pain. The highest score on this item is
associated with patients who admit that there may be pain or
discomfort, and say this in a way that indicates that it is
possible that it could happen to them.

Scoring

Patients state that they expect no pain or
discomfort during the procedure   =   0

Patients state that they there may be
some pain or discomfort, but talk about
it in a way that indicates that they don't
think it will happen to them, or make
statements that minimize its significance   =   1

Patients state that there may be some pain or
discomfort during the procedure, and talk about
it in a way that indicates that it may happen
to them   =   2

13. Do patients minimize the procedure by making statements that
downplay aspects of the procedure and/or the patients' reaction
to it?

Refer to PTCA Interview questions 1, 3a, 6, and 7. This item
refers to whether patients seem to minimize feelings about the
dangers and risks of the procedure.   Several   interview

questions probe areas in which patients may make minimizing statements. When asked questions 1, 3a or 7, patients who minimize will often repeat over and over that the angioplasty is just like the angiogram (note that some will say it is similar, but will go on to say the ways in which PTCA differs from the angiogram). If the patient continuously makes statements like this, and does not go into how the procedures are different, this may indicate a tendency to minimize the angioplasty procedure. In questions 6 and 12, note whether patients are reluctant to talk about troubling things, or make statements such as "I just want to get this over with". In all of the above questions, also note whether patients respond with statements such as "The procedure is like a piece of cake" or other minimizing statements, or make an excessive number of statements (mention more than once or twice) about their confidence in the doctors who will perform the procedure.

Scoring

Patients frequently (3 or more times) make
minimizing statements both about the procedure
and their feelings about it   = 0

Patients occasionally (1 or 2 times) make
minimizing statements, either in relation to the
procedure, or their feelings about it   = 1

Patients never make statements in which
they minimize the dangers of the procedure
or their feelings about it   = 2

14. Do patients make statements in which they minimize their feelings about certain restrictions they may face during the recovery period after discharge from the hospital?

Refer to PTCA Question 14. Note how patients discuss their work, diet and level of activity, paying close attention to whether they indicate that there is a need to be conscious about their condition. Pay close attention to statements in which patients downplay the need to make lifestyle changes or focus predominantly on getting life "back to normal" during the recovery period. Some patients may tend to emphacise the increase in their ability to do things as a result of the procedure more than the limitations in smoking, diet and stress that are necessary to slow the progression of the disease. These patients would be scored lower on this item. Remember that some patients may have already made lifestyle and dietary changes before the angioplasty as the result of an MI or previous surgery. For these patients, note if they use minimizing statements in talking about the recovery period.

Scoring

Patients indicate that there is no reason to be
concerned about the recovery period, that life
will go on pretty much as it did before   =   0

Patients indicate some concern about the recovery
period, but maintain that it won't be that bad,
or minimize the change (statements or laughter),
or state they are more concerned with getting
things back to normal   =   1

Patients indicate that they are concerned about
the recovery period and talk about the
challenges, difficulties, and are benefits
they forsee in making life changes   =   2

Information accuracy and completeness

15. Do patients know the name of the cardiologist who will be performing the angioplasty procedure?

Refer to PTCA Interview question 10. The major cardiologists performing the angioplasty procedure are Drs. Myler, Stertzer, Clarke, Edgett and Millhouse. Dr. Ryan also sees patients, as do the surgeons and anesthesiologists. If patients mention a name other than those listed above, do not count this as knowing the name of the cardiologist. Many of the patients do try to look at their wrist bands when asked this question to find the name of the cardiologist. If it appears that this occurs, score this as a 0.

> Patients indicate that they do not know
> the name of the cardiologist who is going
> to perform their procedure   = 0
>
> Patients give the name of one of the
> cardiologists who typically perform the
> angioplasty procedure   = 1

16. What is the patients' understanding of their medical condition?

Refer to PTCA Interview questions 1, and 3. Note how patients talk about their condition, that is , the nature of the disease (coronary artery disease involving occlusion or build-up of plaque, a spongy-like substance, on the sides of the arteries, which inhibits the adequate supply of blood to the heart muscle, producing symptoms such as angina, shortness of breath, or tiredness, and possibly leading to a heart attack and permanent heart damage or death). Note that patients often talk about veins rather than arteries, which is not accurate and is often a clue that the patient has only a minimal understanding of his or her condition. If patients offer additional facts, such as the specific name of the artery occluded, the percent of occlusion, this would give the patient a higher score on this item.

Scoring

> Patients appear to not understand the nature of
> their condition, referring vaguely to heart
> problems or chest pain   = 0
>
> Patients appear to know only elementary
> facts about their condition ("it is a
> blockage", "a narrowing of my veins",
> "plaque build-up") and offer very little
> detail about the arteries themselves   = 1

Patients appear to have a moderate level of
understanding about their medical condition,
knowing either how many vessels are occluded,
or what percent they are occluded, and
having some sense of the nature and severity
of their condition   = 2

Patients appear to fully understand the nature
of their condition and its severity, discussing
the number of arteries involved (perhaps by name)
and the percent occlusion   = 3

17.   What is the patients' understanding of the treatments that
may be involved for coronary artery occlusion?

Refer to PTCA Interview Question 4.   Note how many options the
patient mentions and to what level the patient appears to
understand the advantages and disadvantages of each treatment,
and the reasons for chosing angioplasty. Angioplasty is usually
the treatment of choice for these patients because they have
severe enough disease that medication is ineffective, and yet
bypass surgery carries more risks and has a much longer recovery
period. Coronary artery blockage is usually treated by 1) no
specific medical treatment, with simple monitoring or risk factor
modifications, 2) drug therapy, 3) angioplasty (PTCA) 4) bypass
surgery (usually in that order).

Scoring

Patients are unable to state any of the
treatment options that are typically
presented to patients with coronary
artery occlusion   = 0

Patients mention only one other option
in addition to PTCA, and appear to have
only a minimal understanding of why PTCA
is the treatment of choice for them, or
appear to depend solely on the physician
in choosing PTCA   = 1

Patients mention at least one other treatment
option in addition to PTCA, and appear to have
a reasonable idea of why PTCA was chosen
over the others   = 2

Patients mention all 4 of the treatments and
are able to discuss the pros and cons of
each as applied to their case, explaining
why it is that angioplasty is the
treatment of choice for them   = 3

18. What is the patients' understanding of the etiology of the disease?

Refer to PTCA Interview question 2. Note whether patients bring up both lifestyle and hereditary factors and in what manner the patient discusses these issues. The major lifestyle contributors are smoking, improper diet (high cholesterol, fat, too much food resulting in obesity - all leading to high blood pressure and high cholesterol), lack of exercise, and excessive stress in work and homelife. Hereditary factors include a family (meaning parents, grandparents, unlces, aunts and siblings) history of heart attacks, treatment for coronary artery occlusion, high blood pressure, and hypercholesterolemia (high cholesterol levels primarily due to liver function). The focus here is not whether patients can list all of the possible hereditary or lifestyle factors, or whether they believe that one or the other or both are responsible, but whether it appears that patients have thought about why this all happened, or may have discussed this with others and/or researched it on their own. Also note below that levels 2 and 3 use the word "discuss". If a patient simply mentions that heredity was involved, but offers no detail (who in the family, what kind of disease, etc.), then they have not "discussed" the factor and would be scored lower. Likewise, with lifestyle factors, if someone simply says "stress", but does not identify where or under what circumstances, this would be rated lower.

Scoring

>Patients are unable to mention any factors
>concerning the etiology of the coronary artery
>disease   = 0

>Patients mention lifestyle and/or hereditary
>factors, but appear to have only a minimal
>understanding of one, or the other, or both,
>providing very little detail when asked
>the question   = 1

>Patients mention either lifestyle or hereditary
>factors initially, and are able to talk about both
>when asked by the interviewer, discussing
>the issues involved   = 2

>Patients initiate a discussion of both lifestyle
>and hereditary factors without being specifically
>asked by the interviewer, appearing to have
>researched or thought about the issues for
>their particular situtation   = 3

19. How complete is the overall major information patients have about the procedure? How complete is overall minor information (20)

Refer to the PTCA Interview, Questions 1, 3a and 7. The major purpose of the angioplasty is to push plaque that is obstructing blood flow in an artery into the lumen of the artery to create a wider opening for the passage of blood. Below is a list of all the events which may potentially occur from the night before the procedure to the evening after the procedure. Refer to this list when judging how complete the patient's information is. The components of the procedure are listed in order of occurrence, but in addition they are marked to indicate whether they are "major" (MAJ) or "minor" (MIN) points. This utility of this distinction will be explained later in the Scoring section.

Major Components of the Procedure:

MIN 1. Either the night before or early in the morning, patient is shaved in the area where catheter will be inserted (arm or thigh), and the chest may be shaved for possible bypass surgery

MIN 2. Patient takes a complete phisohex shower

MAJ 3. Patient is NPO (nothing by mouth) the night before the procedure

MAJ 4. An IV (Intravenous needle with tubing) is started to introduce fluids and medications during the procedure, done either the night before or the morning of the procedure.

MAJ 5. On the morning of the procedure, the patient receives medication to reduce the possibility of coronary spasm (a mild sedative) and to generally relax the patient

MAJ 6. Pre-operative procedure if the arm is used involves a cutdown of the arm (an actual incision in the arm that requires stitching later) to expose the artery in which the catheter will be inserted - if the thigh is involved, no cutdown is needed because the artery is larger and more accessible, so that the catheter can be placed directly into the thigh artery - a local anesthetic is used for both

MAJ 7. The balloon catheter is inserted into the arm or the thigh

MIN 8. Two different catheters are actually used - a guiding catheter, which has a wire on the end of it to facilitate turning as it goes through the arteries; and a balloon or dilating catheter which is inserted through the guiding catheter and has a ballooon on the end which is filled with water and contrast fluid as it is inflated within the artery narrowing the actual inflation

MIN 9. The artery is visualized before angioplasty is performed using a contrast material

MAJ 10. A Balloon catheter is expanded to push the plaque that is occluding the artery against the side of the artery

MIN 11. The balloon cathter may be inflated several times to achieve an adequate opening of the artery

MIN 12. Several different sizes of balloon catheters may be used to open the occlusion

MAJ 13. The patient may experience angina or chest pain due to the ischemia (reduced blood flow) that is caused by inflating the balloon and cutting off the blood flow temporarily through the artery (This is accurate if patient simply mentions that there may be angina or chest pain but does not give reason)

MIN 14. The artery is revisualized using contrast material at the end of the procedure to determine the success of the opening

MAJ 15. After the catheters are all removed, a series of EKG's (electrocardiograms) are taken, usually for about 20 minutes.

MIN 16. Post-op, the arm incision is stitched if it has been used, with a large pressure bandage applied. If the groin area is used no stiches are needed, but a sandbag is placed over the thigh area to control bleeding after pressure has been applied by a staff member.

MIN 17. If there are any EKG abnormalities, the patient may be taken to the Coronary Care Unit CCU for observation – otherwise, patients are sent back to their rooms on the TCU (Transitional Care Unit)

MAJ 18. Patients are monitored for the next 24 hours while on the Transitional care unit with a portable EKG apparatus

MAJ 19. During the next hours, the patient is restricted and is required to remain in bed (for 6 hours if the groin was used, keeping the sandbag on the site, or at least 1-2 hours if the arm was used, keeping it completely immobilized for the first hour)

MIN 20. The patient's blood pressure is taken about every 15 minutes for the 6 hour time period (Accurate if patient says blood pressure taken for 6 hours)

These 20 items represent the ideal knowledge a patient might

have about the procedure. When going through the interview, keep track of how many of the facts are mentioned by the patient. If the patient mentions an area of knowledge, but mentions innaccurate facts the exact information (e.g., the patient says that blood pressure is taken after the procedure, but it is done every hour instead of every 15 minutes), give the person credit for having mentioned that area. However, the area would be marked as inaccurate. It is best to note the inaccuracy immediately by circling the "I" next to the procedural item, indicating an inaccuracy. Use the checklist at the bottom of the scoring sheet to tally facts as you listen to the interview.

Scoring items 19 and 20: These items represent 2 scores - one score for the major facts, and one score for the minor facts known. Using what you marked in the procedural components area of the scoring sheet, for the major fact score (# 19), count the number of major items mentioned and multiply by 2 (top score is then 20). For the minor facts, simply record the score (#20) as the total of the minor items known (top score is then 10).

21. How accurate are each of the facts patients have mentioned about how the procedure will be performed?

Use the scoring scheme below to arrive at a total score for accuracy of facts mentioned. It is best to judge and record the accuracy or inaccuracy of facts as you are scoring the two previous questions. In scoring facts as accurate or inaccurate, attempt to rely more on whether the patient gives information that is obviously inaccurate. For example, the patient may say that he or she will be prepared for the procedure by a cutdown of the artery if this is done in the thigh. This is not accurate, since a cutdown is only done in the arm because of the smaller size of the artery. If the patient mentions that he or she will be having the procedure in the arm or leg, and that they will be "prepared", but don't go into detail about how, assume that they have accurate information and score this as accurate. Since information areas were not probed, it would be unfair to penalize patients for not giving the details we have outlined here. Again, the purpose of this item is to pick up clearly inaccurate concepts the patients have about the procedure. Since it is more important that patients be accurate on the major facts, the following scoring scheme is arranged to take that into consideration. It is also arranged so that for someone to get the top score of three, he or she must mention both major and minor facts.

Scoring

        Patient is inaccurate about all the facts
        mentioned   = 0

        Patient is inaccurate on half or more

of the major facts mentioned, but not all   = 1

Patient is accurate on more than half of the
major facts mentioned, but not all, or is
accurate on all major facts mentioned but
mentions no minor facts, or is inaccurate on
one or more of the minor facts mentioned   = 2

Patient mentions both major and minor facts
and is accurate on all   = 3

22. Do patients feel that they have been given too much information at all?

Refer to PTCA Interview question 9d. Note whether patients make statements indicating that they feel that they have gotten too much information. Some may even add statements to the effect "You can never get too much information" or "The more you know, the better you are."

Scoring

Patients state that they feel they have
been given too much information   = 0

Patients state that they feel they have
not been given too much information   = 1

23. Do patients understand the limitations of the procedure (it may relieve their symptoms, but it is not a cure for coronary artery disease and that it may have to be done again)?

Refer to PTCA Interview questions 3f, 14 and 15. Look for statements that may indicate that the patient has unrealistic expectations about the procedure (e.g., "Now I'm cured and I can go and do anything I want to"). Many of the patients will respond that they expect that the procedure will have positive effects by reducing the pain that they are in, increasing energy and ability to do more activities, or decrease the chance of having future heart attacks. However, the procedure does only widen the artery and does not influence the underlying disease process. Especially note how the patient answers question 15. If the patient acknowledges that he or she may have to have the procedure again, or says that he or she hopes not to have it, but if it does happen, they will do it, score these higher on this item. If, however, patients appear to be somewhat nonchalant about this (e.g., "Nobody wants to have it done again, but if it has to be done, it has to be done"), then they would be scored lower on this item. The main purpose is to pick up those who

believe that coronary artery disease, which is a chronic disorder, is cured by angioplasty.

Scoring

Patients appear to have unrealistic
expectations about the procedure and
may state that they will not have
it again   = 0

Patients give some indication that
they see the limitations in the
procedure and realize that it is not
a cure for the underlying disease   = 1

24. Do patients admit that there are potential risks to the procedure?

Refer to PTCA Interview questions 6a and 7b. Below is a list of possible complications that may occur during or immediately following the procedure:

-possibility of emergency bypass surgery
-myocardial infarction
-possibility of artery puncture/aneurism
-possibility of a dissection (flap of plaque protruding
 from the artery wall after the procedure)
-stroke
-possibility of coronary spasm during or after the
procedure
-bleeding from the catheter entry site
-possibility that angioplasty can not be done
-death

The threatening characteristics may be put into 3 categories based on the likelihood of their occurrence. These are listed below:

Highly unlikely: death, stroke, myocardial infarction

Somewhat unlikely: puncture, rupture or aneurism of the artery, possibility of a dissection (a flap of plaque left hanging from the side of the artery which may lead to more occlusion) possibility of coronary spasm during or after the procedure, possibility of emergency bypass surgery,

More likely: bleeding from the catheter site, inability to do the procedure (due to a complete blockage of the artery, inability to get the balloon through the blockage because of the tightness of the stricture, other anatomical characteristics which might prevent the procedure from being done),

Scoring

Patients do not mention any risks
associated with the procedure   =   0

Patients mention only the more
likely risks, or talk about risks
or complications nonspecifically or
about "something going wrong"   =   1

Patients mention at least one of
the somewhat unlikely risks, and
may mention a more likely risk   =   2

Patients mention at least one risk from
the highly unlikely category, or at
least one from all three categories   =   3

Appendix C

A/V SCORING SHEET

Patient #_____(1-105)   Total Score_____(0-36)

Coding Sheet for the Avoidance Vigilance Interview

Coding Item	Range	Interview Question(s)	Coding Item	Range	Interview Question(s)	Item Order
1. _____	(0-2)	3c	13._____	(0-2)	1,3a,6,7	18
						16
2. _____	(0-2)	3d	14._____	(0-2)	14	1
			<---->			2
3. _____	(0-2)	11	15._____	(0-1)	10	7
						17
4. _____	(0-2)	8	16._____	(0-3)	1,3	8
						9
5. _____	(0-2)	9c,14	17._____	(0-3)	4	10
						24
6. _____	(0-2)	14	18._____	(0-3)	2	12
<---->						13
7. _____	(0-2)	3e	19._____	(0-20) MAJ	1,3a,7	4
						5
8. _____	(0-2)	5	20._____	(0-10) MIN	1,3a,7	22
						15
9. _____	(0-3)	6a	21._____	(0-3)	1,3a,7	3
						11
10._____	(0-2)	6c	22._____	(0-1)	9d	6
						14
11._____	(0-3)	12a,11c	23._____	(0-1)	3f,14,15	23
						19
12._____	(0-2)	7a,7b	24._____	(0-3)	6a,7b	20
						21

Scoring for procedural components

1.shave	_____	A	I	(MIN)	11.infl. rep.	_____	A	I	(MIN)
2.shower	_____	A	I	(MIN)	12.size ball	_____	A	I	(MIN)
3.NPO	_____	A	I	(MAJ)	13.angina	_____	A	I	(MAJ)
4.IV	_____	A	I	(MAJ)	14.revis art.	_____	A	I	(MIN)
5.sedative	_____	A	I	(MAJ)	15.EKG'S	_____	A	I	(MAJ)
6.pre-op	_____	A	I	(MAJ)	16.post-op	_____	A	I	(MIN)
7.cath insrt	_____	A	I	(MAJ)	17.poss. CCU	_____	A	I	(MIN)
8.2 caths	_____	A	I	(MIN)	18.24h monitor	_____	A	I	(MAJ)
9.vis art.	_____	A	I	(MIN)	19.restrcit.	_____	A	I	(MAJ)
10.ball cath	_____	A	I	(MAJ)	20.BP 15 min	_____	A	I	(MIN)

Scoring   Section 1 (S-1) total (items 1-6) _____ (0-12)
          Section 2 (S-2) total (items 7-14) _____ (0-18)
          Section 3 (S-3) total (items 15-24) _____ (0-48)

TOTAL _____ = _____ + .25 (2 (_____) + _____)
                 (S-2)   (S-1)   (S-3)

Appendix D

ADJECTIVE GENERATION FORM

The last item is not about the angioplasty procedure or Coronary Artery Disease, but about how you are feeling today. For this item, think of yourself as you are feeling today and write down five adjectives that best describe yourself. It may help if you choose a word to complete this phrase " Today, I feel _____ " . Please try to use only single words for each of your responses, and use only adjectives (descriptive words).

1._____

2._____

3._____

4._____

5._____

Appendix E

AKS FORM 1

FORM 1

Patient ID Number_____
Date_____

Please answer the following questions. Don't worry if you do not know the correct answer. We are trying to find out what patients know about coronary angioplasty so we can develop better ways to prepare them for the procedure. We appreciate your cooperation in helping us with this effort.

1) Angioplasty is a procedure in which a tube called a catheter is placed in a patient's coronary artery. Please circle the response below which you think best answers each question:

    a)   Where is the catheter initially inserted in order to reach the coronary artery?
        1. In the patient's neck
        2. Always in the patient's thigh
        3. Always in the patient's arm
        4. Either in the patient's thigh or arm
        5. Through an artery in the stomach area

2. Place a check in front of any of the following things which might occur when someone has the angioplasty procedure:

    ____The patient receives a phisohex shower the night before the coronary angioplasty procedure
    ____The patient is given medication so that he or she is not awake for the procedure
    ____An IV (intravenous tube) is inserted into the patient
    ____A complete body shave may be done in case the patient has to have an emergency by-pass surgery
    ____No dye is used during angioplasty because the cardiologist already knows where the blockage is
    ____At the end of the procedure, the patient must remain in the room where the angioplasty was performed for several minutes while several EKG (electrocardiogram) readings are taken
    ____A sandbag is put over the thigh incision where the catheter was inserted after the procedure is completed

_____One hour after the procedure, the patient is encouraged to get up and walk around

Indicate whether you think the following statements are True (T) or False (F) and circle the appropriate letter (T or F) in the left hand column:

T F   3) Patients are permitted to eat breakfast the morning of their angioplasty because it is not considered to be a surgical procedure.

T F   4) About 20 to 25% of patients who have coronary angioplasty will develop restenosis (that is, re-narrowing of the artery) within 6 months after the procedure.

T F   5) The total time for the angioplasty procedure is usually about 2 hours.

T F   6) After the procedure is completed, the patient is usually asked to apply pressure for about 20 minutes to the place where the catheter was inserted.

T F   7) It may take several inflations of the balloon to fully compress the fatty material against the side of the artery wall during angioplasty.

T F   8) Patients may go back to work the day after they return home from the hospital after having coronary angioplasty.

T F   9) Even if you have been smoking for a long time, quitting now will still probably help.

T F 10) All factors that increase the risk of coronary artery disease can be changed.

T F 11) It is recommended that angioplasty patients have a exercise treadmill test and their blood pressure monitored every month for the first 6 months after the angioplasty procedure.

T F 12) One of ways in which both stress and smoking are dangerous is that both can lead to coronary artery spasms.

T F 13) The heart muscle takes some oxygen from the blood as it moves through the chambers of the heart.

T F 14) It is almost impossible to tell the difference between angina pain and pain that is associated with the occurrence of a heart attack.

T F 15) Both saturated and unsaturated fats should be limited by people who have coronary artery disease.

T   F   16) Fish, fowl and liver are excellent foods for people who have coronary artery disease.

T   F   17) Bedrest is the only thing that is required of the patient to prevent complications from occurring after returning to his or her room after the angioplasty procedure.

T   F   18) Coronary Artery Disease is the most common disease in the United States today.

T   F   19) Each patient is required to take prescribed medications for 6 months following the angioplasty procedure.

T   F   20) Patients are given a sedative before angioplasty and are usually not awake enough during the procedure to be aware of what is happening.

21. Research has demonstrated that there are 3 major factors which increase one's risk for developing coronary artery disease, and which contribute to its progression. List the 3 factors below.

1._____
2._____
3._____

22. There are two categories of risk factors which contribute to the development and progression of coronary artery disease - those which can be changed, and those which can not be changed. Give two examples of each on the lines below.

Controllable Risk Factors   Non-controllable Risk Factors

1._____   1._____

2._____   2._____

Appendix F

AKS FORM 2

FORM 2

Patient ID Number_____
Date_____

Please answer the following questions. Don't worry if you do not know the correct answer. We are trying to find out what patients know about coronary angioplasty so we can develop better ways to prepare them for the procedure. We appreciate your cooperation in helping us with this effort.

1. Research has demonstrated that there are 3 major factors which increase one's risk for developing coronary artery disease, and which contribute to its progression. List the 3 factors below.

1._____
2._____
3._____

2. There are two categories of risk factors which contribute to the development and progression of coronary artery disease - those which can be changed, and those which can not be changed. Give two examples of each on the lines below.

Controllable Risk Factors   Non-controllable Risk Factors

1._____   1._____

2._____   2._____

Indicate whether you think the following statements are True (T) or False (F) and circle the appropriate letter (T or F) in the left hand column:

T F   3) Angioplasty may involve slightly more pain than a regular coronary arteriogram because the balloon used must press the fatty deposits of plaque against the sides of the artery.

T   F   4) If the patient feels a "hot flash" during the procedure, this means that the artery has opened up.

T   F   5) It is necessary to monitor the heart with a portable EKG machine for 48 hours after angioplasty to insure that the procedure has been successful.

T   F   6) Plaque found in the coronary arteries is usually made of very hard material.

T   F   7) Since angioplasty is a relatively simple procedure, patients are allowed to walk around one hour after they return to their rooms.

T   F   8) Patients who continue to smoke after angioplasty are at a higher risk for having a renarrowing of the dilated artery.

T   F   9) It is common to leave the balloon inflated in the coronary artery for as long as 5 minutes during angioplasty.

T   F   10) Only a small number of people (about 10 out of 100) have to undergo emergency coronary bypass surgery if angioplasty is not successful.

T   F   11) One should wait at least a month after angioplasty before beginning a physical exercise program.

T   F   12) Attempting to decrease the stress and strain in one's life can be helpful in slowing down the clogging of the arteries.

T   F   13) The cholesterol level in our system is determined by both the kinds of food we eat and by our liver function.

T   F   14) The heart has two sides, the left and right, with the right side receiving blood from the body and pumping it to the lungs, while the left side pumps blood to the body.

T   F   15) Angina is a pain that signals the occurrence of some permanent damage to the heart.

T   F   16) Pain associated with a heart attack is different from angina pain in that it is not usually relieved by resting.

T   F   17) Most canned food products should be limited because of the high salt content found in them.

T   F   18) Spices and herbs should be limited by people with coronary artery disease because these substances can elevate the blood pressure.

T   F   19) The coronary arteries are located within the heart chambers.

T F 20) Nitroglycerin should be renewed yearly.

21) Angioplasty is a procedure in which a tube called a catheter is placed in a patient's coronary artery. Please circle the response below which you think best answers each question:

    a) Where is the catheter initially inserted in order to reach the coronary artery?
       1. In the patient's neck
       2. Always in the patient's thigh
       3. Always in the patient's arm
       4. Either in the patient's thigh or arm
       5. Through an artery in the stomach area

22. Place a check in front of any of the following things which might occur when someone has the angioplasty procedure:

   ____The patient receives a phisohex shower the night before the coronary angioplasty procedure
   ____The patient is given medication so that he or she is not awake for the procedure
   ____An IV (intravenous tube) is inserted into the patient
   ____A complete body shave may be done in case the patient has to have an emergency by-pass surgery
   ____No dye is used during angioplasty because the cardiologist already knows where the blockage is
   ____At the end of the procedure, the patient must remain in the room where the angioplasty was performed for several minutes while several EKG (electrocardiogram) readings are taken
   ____A sandbag is put over the thigh incision where the catheter was inserted after the procedure is completed
   ____One hour after the procedure, the patient is encouraged to get up and walk around

Appendix G

AKS FORM 3

FORM 3

Patient ID Number_____

Date_____

Please answer the following questions. Don't worry if you do not know the correct answer. We are trying to find out what patients know about factors which may contribute to coronary disease so we can develop better ways to prepare them for what to expect after they have had coronary angioplasty. We appreciate your cooperation in helping us with this effort.

PLEASE NOTE: Answer these questions with the knowledge you currently have. Please do not consult books or persons you feel might know the answers. We are not testing you to find out what you as an individual know, but we are interested in what all patients generally know after they have been through our program. Thank you for helping us in this.

Indicate whether you think the following statements are True (T) or False (F) and circle the appropriate letter (T or F) in the left hand column:

T F 1) Plaque found in the coronary arteries is usually made of very hard material.

T F 2) Patients who continue to smoke after angioplasty are at a higher risk for having a renarrowing of the dilated artery.

T F 3) Attempting to decrease the stress and strain in one's life can be helpful in slowing down the clogging of the arteries.

T F 4) Even if you have been smoking for a long time, quitting now will still probably help.

T F 5) One should wait at least a month after angioplasty before beginning a physical exercise program.

T F 6) All factors that increase the risk of coronary artery disease can be changed.

T F 7) Patients may go back to work the day after they return home from the hospital after having coronary angioplasty.

T F   8) It is recommended that angioplasty patients have a exercise treadmill test and their blood pressure monitored every month for the first 6 months after the angioplasty procedure.

T F   9) The cholesterol level in our system is determined both by the kinds of food we eat and by our liver function.

T F   10) One of ways in which both stress and smoking are dangerous is that both can lead to coronary artery spasms.

T F   11) Angina is a pain that signals the occurrence of some permanent damage to the heart.

T F   12) It is almost impossible to tell the difference between angina pain and pain that is associated with the occurrence of a heart attack.

T F   13) Pain associated with a heart attack is different from angina pain in that it is not usually relieved by resting.

T F   14) Both saturated and unsaturated fats should be limited by people who have coronary artery disease.

T F   15) Most canned food products should be limited because of the high salt content found in them.

T F   16) Fish, fowl and liver are excellent foods for people who have coronary artery disease.

T F   17) Spices and herbs should be limited by people with coronary artery disease because these substances can elevate the blood pressure.

T F   18) Coronary Artery Disease is the most common disease in the United States today.

T F   19) Each patient is required to take prescribed medications for 6 months following the angioplasty procedure.

T F   20) Nitroglycerin should be renewed yearly.

21. Research has demonstrated that there are 3 major factors which increase one's risk for developing coronary artery disease, and which contribute to its progression. List the 3 factors below.

1._____
2._____
3._____

22. There are two categories of risk factors which contribute to the development and progression of coronary artery disease – those which can be changed, and those which can not be changed.

Give two examples of each on the lines below.

Controllable Risk Factors   Non-controllable Risk Factors

1._____   1._____

2._____   2._____

Appendix H

6-MONTH PHYSICIAN FOLLOW-UP

Patient ID Number_____   Date_____

6 MONTH QUESTIONNAIRE - PTCA RESEARCH STUDY
San Francisco Heart Institute - Seton Medical Center

Please   answer the following questions for the patient whose
   name appears on the memo attached to this questionnaire

Section 1 - Results of Medical Tests

1) Has this patient had a follow-up coronary angiogram since
having Percutaneous Transluminal Coronary Angioplasty (PTCA) at
Seton Medical Center in San Francisco on _____?

(please check one)   ____Yes
                                                ____No
                                                ____Uncertain

    a) If yes, was there restenosis at any of the site(s) of
angioplasty?

                                                ____Yes
                                                ____No

    b) Please provide the following data if available:

                                    Site   current % stenosis
                                    ____   ____%
                                    ____   ____%
                                    ____   ____%
                                    ____

    c) Since the angioplasty at Seton, was any new significant
stenosis (% occlusion > 60%) identified?

                                                ____Yes
                                                ____No

2) Has the patient had any treadmill studies since the PTCA at
Seton?
                                                ____Yes
(please check one)   ____No

_____Uncertain

If yes, please provide any information available in the first section on the other side of this page:

Date (Status post angioplasty)   Overall Rating
_____ (1 month)   _____positive   _____negative
_____ (3 month)   _____positive   _____negative
_____ (6 month)   _____positive   _____negative

3) Has this patient experienced any of the following heart related complications or had surgery since the PTCA at Seton?

yes	no	uncertain	
___	___	___	Hospitalization for chest pain?
___	___	___	Heart attack?
___	___	___	Arrythmias?
___	___	___	Coronary artery bypass surgery?
___	___	___	Additional Angioplasty?
			_____(other - list)

4) Please fill in the most recent information available and date for the following laboratory tests and physical data:

Weight in pounds - Date   Cholesterol level - Date

_____   _____   _____   _____

Angina class   - Date   Triglyceride level - Date

_____   _____   _____   _____

Section 2 - Cardiac Rehabilitation Information

5) Status of patient's cigarette smoking:

_____non-smoker   _____1-2 packs a day
_____ex-smoker   _____3+ packs a day
_____0-1 packs a day   _____status unknown

6) Does the patient appear to be following a diet that is low in cholesterol, animal fat and sodium?

_____yes   _____no   _____uncertain

7) How would you rate the current activity level of this patient?

_____ activity at a higher level than before initial PTCA
_____ activity at the same level as before initial PTCA
_____ activity at a lower level than before initial PTCA

8) Check the statement below which best describes this patient's current general condition as compared to his or her general status before having Coronary Angioplasty at Seton 6 months ago?

_____ condition better now as compared to before

_____ condition the same now as compared to before
_____ condition worse now as compared to before

Thank you for your time and cooperation in completing this survey.

Appendix I

6-MONTH PATIENT FOLLOW-UP

Instructions: Please answer the following questions as honestly as you can. In all of these questions, you are asked to compare aspects of your life as they are now to how they were before you had the angioplasty procedure 6 months ago. Remember that all of your responses will be kept confidential.

1. Please check the sentences below which apply to you:

    A_____ I was retired or not working before my angioplasty 6 months ago

    B_____ I have not returned to work since my angioplasty

    C_____ I have retired since having the angioplasty 6 months ago

    D_____ I am now working at a less demanding job

    E_____ I have returned to the job I worked at before having the angioplasty 6 months ago (or a comparable job), but I am not yet fully active

    F_____ I am fully active in the job I had before having the angioplasty 6 months ago (or in a comparable job)

2. A_____ I am working more efficiently now than I was before having the angioplasty procedure 6 months ago

    B_____ I am working at the same level of efficiency now as I was before I had the angioplasty 6 months ago

    C_____ I am working less efficiently now than I was before I had the angioplasty procedure 6 months ago

Please check any activities in which you participate and your level of involvement.

3. Hobbies (give an example)_____

    A_____ less than before the angioplasty 6 months ago
    B_____ same as before the angioplasty 6 months ago
    C_____ more than before the angioplasty 6 months ago
    D_____ I have just begun this activity

4. Outdoor recreation (give an example)_____

    A_____ less than before the angioplasty 6 months ago
    B_____ same as before the angioplasty 6 months ago
    C_____ more than before the angioplasty 6 months ago
    D_____ I have just begun this activity

5. Community/Church Involvement

A_____   less than before the angioplasty 6 months ago
B_____   same as before the angioplasty 6 months ago
C_____   more than before the angioplasty 6 months ago
D_____   I have just begun this activity

6. Social Activities

A_____   less than before the angioplasty 6 months ago
B_____   same as before the angioplasty 6 months ago
C_____   more than before the angioplasty 6 months ago
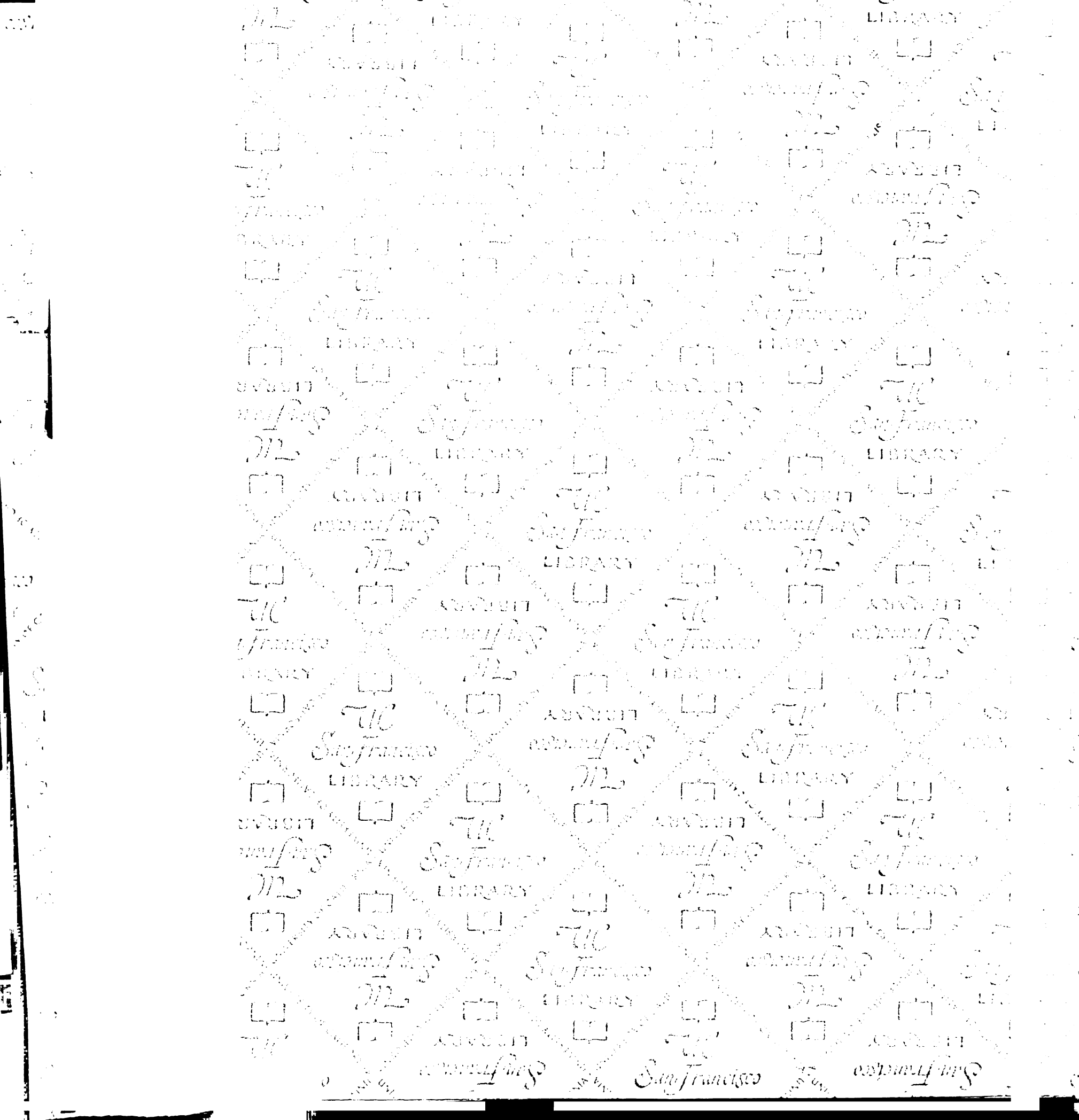D_____   I have just begun socializing again

7. Are there any activities that you have given up since you had the angioplasty 6 months ago which you were doing before the procedure?   If so, please list them below.

_____
_____
_____
_____