

COMPLIANT BEHAVIOR AMONG INDIVIDUALS
INFECTED WITH TUBERCULOSIS

by

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ABSTRACT

This was a descriptive study designed to identify reasons individuals gave for continuing on a twelve-month medication regimen after being told they were infected with tuberculosis. The purpose of the study was to determine whether or not there was any relationship between the concepts of the Health Belief Model (HBM) and compliant behavior. The modifying factors of knowledge and general health behavior were examined to determine their relationship, if any, to compliant behavior.

The conceptual framework for this study was based on the HBM formulated by Hochbaum et al. (1958). The major concepts of the HBM included and suggested that individuals who: (1) feel susceptible to contracting a disease; (2) believe the disease can have serious repercussions; and (3) believe the treatment regimen will be effective and see no major barriers to treatment accessibility, were more likely to comply with recommended medical regimens than those not holding these beliefs.

Thirty Mexican-American subjects from a local health department Chest Clinic participated in the study and completed questionnaires in their homes. Fifteen subjects were female and fifteen were male. The mean age of

the study subjects was 34.2 years. Data were collected utilizing a forty-five-item, three-part questionnaire developed by the investigator based on a review of the literature.

Analysis of data revealed that the key motivator behind subjects' decision to continue on the medication regimen was their desire to prevent the development of active tuberculosis. The subjects in this study were found to have a "moderate" level of perception to the concepts of the HBM as developed for this study. Thus, a relationship between the concepts of the HBM and compliant behavior was found to exist in the study sample. Twenty-six (86.6 percent) of the subjects scored "moderate" to "high" in knowledge about tuberculosis. Twenty-one (71.3 percent) of the subjects answered the general health behavior category in the desired direction. Knowledge and general health behavior may, therefore, have had an influence on compliant behavior of the subjects in this study.

CHAPTER 1

INTRODUCTION

Tuberculosis is a communicable, infectious disease. It is no longer the plague of former years; it is a curable, even a preventable disease. Tuberculosis control depends on proper surveillance by health professionals and containment by patient compliance with preventive medication regimens. However, unsatisfactory patient compliance with medication regimens is the most serious remaining problem in the control of tuberculosis in the United States (Addington 1979).

Preventive treatment for tuberculosis involves use of Isoniazid (INH) taken daily over a period of twelve months. INH acts by diminishing the bacterial population, thus decreasing chances of the active disease developing. Such chemotherapy has revolutionized the treatment of tuberculosis and individuals with the infection who have adhered to and completed the prescribed twelve-month medication regimen are usually considered cured of the potential to develop active tuberculosis.

Most treatment failures are due to poor compliance; that is, an interruption of self medication. Many studies have been conducted which have attempted to identify those

factors which influenced compliant behavior (Sackett and Haynes 1974; Zifferblatt 1975; Dudley 1979). Some of these factors include: education, demographic data, culture, socioeconomic status, and personal traits. Despite the available descriptive data, very little information exists that is useful in overcoming the problem of non-compliance (Marston 1978). Perhaps the question should be reversed--not why don't individuals comply with their medical regimens, but rather why do they bother to comply?

The focus on compliance has become increasingly important as health care professionals attempt to concentrate on prevention. Less direct supervision by health professionals occurs at the preventive level. With the advent of chemotherapy, the emphasis on tuberculosis treatment has shifted from sanatoria and hospitals to outpatient clinics of local health departments and private physicians' offices. Much of the responsibility rests with individuals to take their medication daily, making compliance imperative for effective health care maintenance.

The number of active cases and deaths from tuberculosis has steadily decreased each year. Nevertheless, tuberculosis remains with us and is likely to do so for years to come. The number of tuberculosis cases reported in the United States for 1978 according to the 1979 Tuberculosis Statistics compiled by the Center for Disease

Control (CDC) was 28,521. "The vast majority of tuberculosis cases each year arises from the already infected minority of the population that constitutes the 'reservoir' of tuberculosis infection" (Farer 1978, p. 1). The Center for Disease Control has estimated that there are 15 million persons infected with the tubercle bacillus. The only detectable sign of infection in such persons is their ability to react positively to a tuberculin skin test.

The population infected with tuberculosis is larger than the number of active tuberculosis cases because every diagnosed case of tuberculosis in this country has an average of seven contacts. Twenty-one percent of these contacts were found to be infected when examined (Farer 1978). The Center for Disease Control also estimated that about 5 percent of all newly infected persons would develop active tuberculosis within one year of their infection; the remainder would be added to the "reservoir of infection" and carry the life long risk of potential disease (Farer 1978).

This study focused on individuals who had tuberculosis infection without the active disease. These individuals were exposed to tuberculosis droplet nuclei, became infected, and had not yet developed active tuberculosis. They had positive tuberculin reactions (Purified Protein Derivative [PPD] skin test) and may have had other risk

factors that made them candidates for preventive therapy. Persons comprising this population included both positive PPD reactors and convertors. A reactor is an individual who has shown a positive PPD reaction either in the past or at the present time. A convertor is an individual who has, in the previous year, shown a negative PPD reaction and who now has a positive PPD reaction.

In order to secure disease protection, preventive services must be delivered to the greatest number of individuals possible. Nurses probably have the best potential of any health professional for exerting an impact on the health behavior of individuals because of their frequent contacts with the individuals. If specific determinants which influence compliant behavior can be identified, then these factors perhaps can provide the basis for planning and teaching individuals about tuberculosis, medications, and prevention. Thus the topic of compliance is a relevant one for investigation and study through nursing research.

Statement of the Problem

This study was designed to answer the following questions:

1. What factors influence an individual's decision to continue on a medication regimen for tuberculosis infection?
2. Do compliant individuals subscribe to the

following three concepts contained within the Health Belief Model:

- a. feel susceptible to contracting active tuberculosis?
 - b. perceive that to contract active tuberculosis would result in serious repercussions?
 - c. perceive that the recommended medication regimen will be effective (benefit) regardless of the barriers encountered, if any, in obtaining care?
3. Is there a relationship between knowledge about tuberculosis and the individual's perception toward each of the HBM concepts?
 4. Is there a relationship between general health behavior and compliant behavior?

Significance of the Problem

Long term illnesses, unlike acute illnesses, generally require individuals to assume more responsibility for their own health maintenance and care. Thus there has been an increased emphasis on the need for health professionals to understand and modify individuals' health behavior concerning compliance with recommended medical regimens.

The Center for Disease Control receives reports for individuals with active tuberculosis who complete their chemotherapy within 24 months. In 1975, 4,929 of 6,711

individuals diagnosed with active tuberculosis completed chemotherapy. These data revealed that 23 to 31 percent of individuals with newly diagnosed tuberculosis did not complete their chemotherapy within 24 months. If these data were extrapolated to all individuals in the United States, the estimates for the number of individuals with active tuberculosis not completing chemotherapy within 24 months for the years 1970 to 1975 would range between 7,130 and 11,512 out of a total number of between 30,998 and 37,137 individuals (Addington 1979).

Individuals with active disease who have not completed chemotherapy continue to harbor tuberculosis bacilli and if those infected also fail to begin or complete prophylactic chemotherapy, control of tuberculosis remains unattained. What happens to individuals who fail to complete chemotherapy? In a 1979 study conducted by Addington (1979) in Cook County Hospital in Chicago, 71, 65, and 32 patients diagnosed with active tuberculosis and who did not complete chemotherapy died respectively from totals of 282, 249, and 222 patients. Thus, death occurred within two years of the diagnosis of bacteriologically positive tuberculosis among these patients. Re-treatment regimens generally have been more complicated, more toxic, and more expensive. While new cases of pulmonary tuberculosis have continued to decline, the level of extrapulmonary

tuberculosis has remained nearly constant for the last decade (Farer 1978). The cost would be less too, if initial therapy were successful and multiple hospitalizations and treatment failure could be prevented.

The problem of identifying factors that influenced compliant behavior among individuals infected with tuberculosis warranted closer examination and research investigation. Individuals infected with tuberculosis were in a unique position of not being diagnosed as having an illness, yet received a medication regimen similar to that of a diagnosed case of active tuberculosis. Those individuals who were in the process of completing chemoprophylactic regimens had made the appropriate alterations in their lifestyles in response to having tuberculosis infection. Perhaps these individuals could provide additional insight into the problem of why some persons comply with medical regimens and others do not.

Purpose of the Study

The purpose of this study was to identify reasons individuals gave for continuing on a twelve-month medication regimen for tuberculosis infection. In addition, the investigator was interested in determining whether or not there was any relationship between the three concepts of the Health Belief Model and compliant behavior. Possible modifying factors that influenced compliant behavior in

this study sample that were examined were general types of health behavior and the individual's level of knowledge about tuberculosis.

Rezac (1974) has pointed out that as nurses expand their roles and become increasingly instrumental and responsible in motivating individuals toward compliance, it would seem beneficial to determine the areas in which nurses' efforts would prove most fruitful. Furthermore, if it could be determined why individuals chose to continue in chemoprophylactic regimens, then nurses could focus their intervention efforts on those identified factors to attempt to motivate the non-compliant tuberculosis infected individual to comply with preventive therapy. This would help to control the spread of tuberculosis by reducing the potential for active cases of tuberculosis.

The Conceptual Framework

The conceptual framework on which this study was based was the Health Belief Model (HBM) formulated by Hochbaum et al. in 1958. The HBM has been used to predict preventive health behavior in the absence of known illness. Briefly described, the major concepts of the HBM include and suggest that individuals who: (1) feel susceptible to contracting a disease; (2) believe the disease can have serious repercussions; (3) believe the treatment regimen will be effective and see no major obstacles or barriers

to treatment accessibility, are more likely to comply with recommended medical regimens than those not holding these beliefs (Weisenberg, Kegeles, and Lund 1980).

Perceived susceptibility at one extreme may be demonstrated by the individual who denies any possibility of contracting a given condition; by an individual who admits to the "statistical" possibility of a disease occurrence but a possibility that is not likely to happen; and, in the opposite extreme, an individual who expresses a feeling that a real danger of contracting the condition exists (Becker 1974). Seriousness may refer to an emotional arousal or difficulties the individual believes a condition will create in a job status or with the family. Barriers refer to anything an individual perceives as possibly interfering with care acquisition; for example, clinic locale, transportation, or costs. A person may believe that treatment will be effective but, at the same time, barriers may exist which modify the individual's health seeking behavior.

Becker (1974) has identified three situations that could occur in the presence of barriers. These three possible situations were:

1. If readiness to comply was high and the negative aspects (barriers) were seen as weak, then compliant action was likely to be taken.

2. If readiness to comply was low while potential negative aspects were seen as strong, the negative aspects functioned as barriers to care acquisition.

3. If readiness to comply was high and there were strong barriers, there was a fifty-fifty chance that the individual would obtain care and comply with recommended medical regimens.

The Health Belief Model also postulates that a "cue to action" or "motivation" must occur to trigger the appropriate health behavior. This trigger can be internal (for example, interpersonal interactions), or external (for example, television messages). The model asserts that compliant behavior will not ensue unless there is both a perceived susceptibility and perceived severity to the disease present. The combined levels of susceptibility and severity provide the energy or force to act and the perception of benefits minus barriers provides the preferred course of action. According to Becker (1974), the combination of these could reach considerable levels of intensity without resulting in overt action unless some instigating event or "cue to action" occurred to set the process in motion. These "cues to action" vary with the difference in the levels of susceptibility and severity. Unfortunately, it is very difficult to measure or identify these "cues to action" because they can involve numerous things,

some of which may be forgotten with the passage of time; for example, a casual view of a poster urging skin tests.

The Health Belief Model implies that certain levels of readiness are optimal in stimulating behavior but neither theory nor research have disclosed what these levels are. In most studies, limitations in sample size have necessitated dichotomizing scores on the variables into categories of "high" and "low." Until data can be collected on at least an ordinal score, the problem of determining optimal quantities will not be solved and the dispute between threshold effects and linear relationships as predictors of behavior will not be resolved (Becker 1974).

The original model had a disease avoidance orientation, but the model has since been expanded to include a health motivation component. This category was added because it was possible that positive health motivators existed and individuals engaged in actions having health implications but for reasons unrelated to health (Becker et al. 1977). It was assumed that various sociodemographic factors could influence individuals' health beliefs and perceptions but these factors might not necessarily lead to compliant behavior (Becker and Rosenstock 1978).

Numerous studies (Becker, Drachman, and Kirscht 1974; Becker et al. 1977; Becker and Rosenstock 1978;

Weisenberg, Kegeles, and Lund 1980) have been conducted using the HBM. These studies have provided substantial evidence of the model's utility in predicting and explaining health behavior. Some researchers have stated that the HBM appeared to possess construct validity and reliability (Maiman et al. 1977; Cummings, Jette, and Rosenstock 1978). Most research to date using the HBM has demonstrated that compliance has been greatest when the individual has subscribed to beliefs in perceived susceptibility, seriousness, effectiveness of treatment, and when there have been few barriers to care acquisition (Marston 1978).

The HBM approach to predicting behavior has often been termed "value expectancy" (Becker 1974). That is, behavior has been predicted from the value of an outcome to an individual and from the individual's expectation that a given action would result in that outcome (Sackett and Haynes 1974). In this study, compliance was viewed as a function of subjective perception.

Beliefs, values, and traditions influence the types of behavior that individuals exhibit. Individuals evaluate a situation and, unless they perceive the situation as important, they may not act upon the situation. Health behavior is linked to motivation; that is, action is taken only when the individual is concerned about the situation. To understand health behavior as it relates to compliance,

one must look at how individuals perceive the situation, what significance the situation has for them, and what they perceive as possible courses of action (Giss 1975).

Earlier studies of reactions to illness have dealt mostly with sociodemographic variables rather than with theoretically derived attitudes and subjective perceptions (Kasl and Cobb 1966). The problems of past research have arisen mainly from a past predilection for a "medical model" of compliance which confined its search for closed determinants to easily identified and quantifiable variables such as patient characteristics, treatment regimen, and the specific illness (Becker 1974). Sociodemographic variables are not necessarily related to motivation since findings in these areas are not able to account for the large numbers of individuals who, despite the presence of many adverse characteristics, still follow recommended therapy.

Haefner and Kirscht (1970, p. 478) summed up the importance of approaching research from a "perception-motivation-behavioral" view by stating that "interest must be directed not only to persuading potential individuals to enter and stay in the health care system before symptoms appear, but also to educate them to adopt certain personal health practices which may reduce the probability of premature serious illness." The perceptions and beliefs that

make up the HBM have been demonstrated to be alterable; thus, by knowing which model components are below a level presumed necessary for compliance, the health professional may be able to tailor an intervention to suit the particular needs of each individual (Sackett and Haynes 1974).

This present study focused only on the HBM concepts of susceptibility, seriousness, and benefits minus barriers. Additional modifying factors of knowledge and general health behavior also were studied to determine whether or not these factors modified or influenced the individual's perception in relation to the HBM concepts. For a diagrammatic representation of the HBM, adapted from Hochbaum (1958), refer to Figure 1. The diagrammed model identifies the relationship between perception and expected compliant outcome. A positive relationship was predicted between the perception of susceptibility, severity, and benefits minus barriers and their effect on compliant behavior. The relationship of the modifying factors could be either negative or positive in relation to compliant behavior. However, it was assumed that any negative factors were overridden by the already established compliancy of the sample population.

In this study, the concepts of the HBM were studied in relation to the health beliefs of individuals infected with tuberculosis. The model was interpreted to mean that compliant behavior is exhibited in individuals who

Individual Perceptions

Modifying Factors

Likelihood of Action

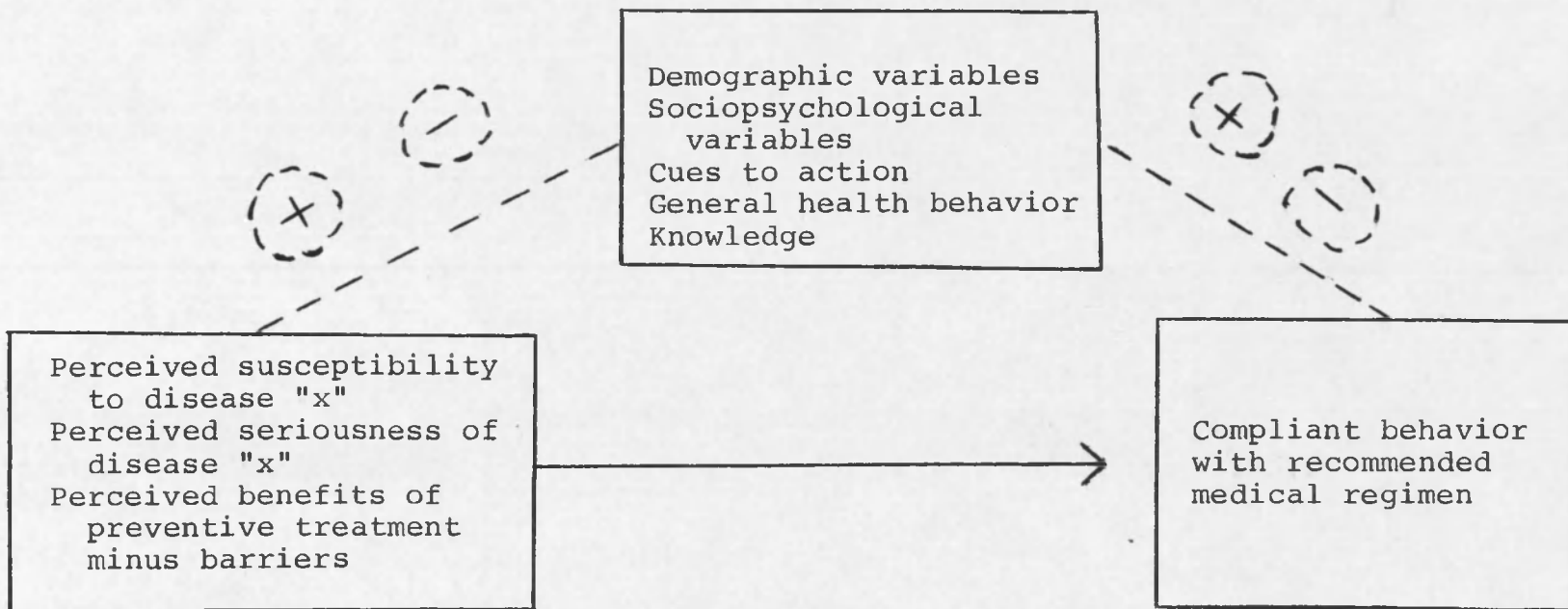


Figure 1. Diagram adapted from Hochbaum's Health Belief Model (1958).

subscribed to the concepts of the HBM. Thus, the model was used to test retrospectively the extent to which tuberculosis infected individuals, compliant with their chemoprophylactic regimens, subscribed to the concepts of the HBM.

Operational Definitions of Terms

For this study, the following definitions of terms were used:

1. Compliance: patient behavior exhibited by monthly attendance to the Chest Clinic for six to twelve consecutive months of chemoprophylactic therapy.
2. Active tuberculosis: a diagnosed case of tuberculosis disease based on bacteriologically positive results.
3. Tuberculosis infection: state of being infected with tubercle bacilli without active disease, but with a positive tuberculin skin reaction present.
4. Convertor: an individual who had, in the previous year, shown a negative tuberculin skin test and who now has a positive tuberculin skin test.
5. Reactor: an individual who has in the past or at the present time shown a positive reaction to a tuberculin skin test.
6. Chemoprophylaxis regimen: daily ingestion of only Isoniazid (INH) for six to twelve months.

7. Perceived susceptibility: individuals' subjective perceptions that they had a chance for contracting active tuberculosis.

8. Perceived severity: individuals' subjective perceptions that contracting active tuberculosis would result in serious organic and/or social repercussions.

9. Perceived benefits: individuals' belief in the ability of INH to prevent or reduce the severity of tuberculosis, belief in the doctors' ability to cure the disease, and faith in the recommended medical regimen.

10. Perceived barriers: any factor(s) identified by clients as hindering care acquisition.

CHAPTER 2

REVIEW OF THE LITERATURE

The literature review is divided into two sections. The first section deals with selected references focusing on compliance in relation to the concepts of the Health Belief Model (HBM). The second section deals with attendance behavior in ambulatory care clinics in relation to compliance.

Health Belief Model Studies

Numerous studies have been done to determine if there is any relationship between compliant behavior and other variables such as age, sex, education, religion, socioeconomic status, race, and personality traits. These variables have not been established as reliable indicators of compliance (Zifferblatt 1975). Only the patient-doctor relationship has consistently been documented as a variable that influenced patient compliance (Dudley 1979). However, studies using the HBM have shown significant correlations between each major concept of the HBM and the predicted outcome of compliance (Becker et al. 1974; Becker et al. 1977; Becker and Rosenstock 1978; Weisenberg, Kegeles, and Lund 1980). These researchers all concluded that

compliance with a recommended medical regimen could be predicted on the basis of an individual's perception regarding susceptibility to the disease, possible severity of the disease if contracted, and efficacy of the recommended medical regimen.

In 1958, Hockbaum originated research on the HBM. He studied 1200 adults in three cities in an attempt to identify factors underlying the decision to obtain a chest x-ray for the detection of tuberculosis. Belief about the susceptibility to tuberculosis and belief about the benefit of early detection were studied. In the group of persons who held both beliefs--that is, belief in their susceptibility to tuberculosis and the belief that overall benefits would accrue from early detection--82 percent (984 individuals) had had at least one voluntary chest x-ray prior to the interview. In the group holding neither of these beliefs, only 21 percent (252 individuals) had obtained voluntary chest x-rays prior to the interview. Thus, four out of five people who held both beliefs took the predicted action, while four of five people who accepted neither of the beliefs did not take the action. The number of persons in each of the groups was not given in the study.

Levanthal, Hochbaum, and Rosenstock (1960) investigated the concept of perceived susceptibility of influenza in families. A sample of eighty-six randomly selected

respondents was chosen in each of two medium-sized cities. Each respondent was interviewed twice. The first interview was conducted before most people had the opportunity to seek vaccination or take any other preventive action and before much influenza-like illness had occurred in either community. The second interview was made after all available evidence indicated that the epidemic had subsided.

At the time of the first interview, 12 of the 86 respondents scored high on a combination of beliefs in relation to their susceptibility to influenza and the severity of the disease. The remaining 74 persons rejected either their susceptibility to the disease or its severity or both. Five of the 12 subsequently made preventive preparations. Analyses of these data, although the samples were small, suggested that prior beliefs concerning susceptibility and severity were instrumental in determining subsequent action.

In another early study of the HBM by Kegeles (1963a), factory employees who had free dental care available for themselves and their families were interviewed (Weisenberg, Kegeles, and Lund 1980). Those who believed they were highly susceptible to dental problems, that dental problems could be serious, and that they could take beneficial action against dental problems, made more preventive visits to see a dentist in the three years prior

to the interview than those who believed they were barely susceptible. Eighty percent of the respondents who scored high on all the beliefs had made preventive visits, whereas none of those scoring low on all three beliefs had done so. One difficulty in interpreting the results of this study was that the sample size used in the study was not given.

To determine if the health beliefs of this factory population would predict their subsequent behavior as well as their past behavior, a study using the original group was conducted (Kegeles 1963b). Questionnaires dealing with behavior subsequent to the interview were sent to the participants three years later (the sample size was not given). Persons who had perceived themselves as highly susceptible to dental problems in the first survey still made more subsequent preventive visits than did those who had perceived themselves to be barely susceptible. No relationship, however, was found to exist between preventive visits and perceived seriousness and perceived benefits of dental care. Other non-belief variables that emerged from this study included past health behavior, level of education, income, occupational status, and fear and anxiety about dental treatment.

The HBM was also used to study compliance with a prophylactic regimen following rheumatic fever (Heinzelmann 1962), accepting recommendations for diabetes testing

(Zwicker 1968), obtaining Pap smears (Kegeles 1969), and predicting mothers' compliant behavior with recommended medical regimens for their children with otitis media (Becker et al. 1974). The HBM also has been used in studies for predicting dietary compliance (Becker et al. 1977), compliance with a medical regimen for asthma (Becker and Rosenstock 1978), and children's beliefs and acceptance of preventive dental regimens (Weisenberg et al. 1980).

Perhaps the best direct support for the relevance of the HBM to producing changes in health behavior was the study by Haefner and Kirscht (1970). They attempted experimentally to increase people's readiness to follow preventive health practices by investigating the effects of their viewing teaching films on heart disease, cancer, and tuberculosis. The messages in these teaching films were intended both to increase individuals' perceived susceptibility and/or severity regarding the health programs and their beliefs in the efficacy of professionally recommended behavior.

One week before the films were shown, the study group of 166 non-academic university employees completed a questionnaire on their beliefs about health and illness, and about past health-related actions they had taken. The 166 persons were then randomly assigned into three experimental groups and a control group. Only the experimental

groups were shown the health films and answered additional questions. The control group did not view the films.

Eight months after the films were shown, another questionnaire on health-related behavior was sent to all the participants. Only 135 questionnaires were completed (102 experimental group participants, 33 control group participants).

The findings indicated that a greater number (not given in study) of persons from the experimental group (102 individuals) visited a physician for a check-up in the eight months following the experiment than in the control group (33 individuals). This difference held only for visits made in the absence of symptoms. For those individuals with symptoms, the rate of physician visits was the same in both groups. This study provided evidence that it was possible to modify individuals' perceived susceptibility to a disease, and that such modification did lead to predictable changes in health behavior.

Appointment Keeping Behavior

In addition to the HBM concepts of perceived susceptibility, seriousness, and effectiveness of treatment, compliance is further enhanced if those professionals working with the patient remove as many barriers to care acquisition as possible (Marston 1978). An example of a barrier is the clinic facility itself; that is, its

location, comfort, and layout. Thus, one way to measure the influence of barriers on individuals' compliancy is to measure their appointment keeping or clinic attendance behavior.

Frankel and Hovell (1978) conducted an extensive review of the literature on appointment keeping for health services during the years 1960 through 1977. They found that keeping appointments was dependent upon individuals' previous experiences at the clinic. Variables such as the friendliness of the staff, the quality and quantity of health services received, and the outcome from such services were important in determining the probability of individuals returning to the clinic.

Some added cues to increase the probability of appointment keeping and tipping the balance in favor of patient clinic attendance were identified by Frankel and Hovell (1978). These cues included: (1) arranging convenient appointment slots; (2) sending a mailed reminder or making a phone call; (3) good parking and easy-to-find clinic; (4) available baby-sitting; (5) short waits; (6) familiar doctor or nurse; (7) providing a "reward" for kept appointments, such as a discount on medical charges (for a complete listing see Appendix A). Some possible aversive cues included: (1) bad phone contact; (2) poor weather; (3) lack of transportation; (4) uncomfortable

waiting room; and (5) reason for return appointment not explained.

Other findings by Frankel and Hovell (1978) showed that the availability of transportation, waiting time to see the physician, and to some extent patient-physician relationships were potentially alterable behaviors influencing appointment keeping. It could be postulated, therefore, that if individuals have had the repeated experience that their efforts have been effective in getting for them those things which they perceive of value, they would develop positive perceptions about the benefits of care acquisition and perceive fewer barriers to care acquisition. Theoretically, such a belief in personal control or personal causation should influence the extent to which individuals subscribe to the HBM.

Current literature is beginning to document a need for further understanding the relevance of perceived attitudes of significant others and of important reference groups (Marston 1978). Evidence is mounting that the family exerts a greater influence on compliant behavior than has been recognized for three reasons: (1) non-ill family members must assume responsibility for compliance with medical regimens on the part of dependent family members such as children, the aged, and disabled; (2) specific roles within the family may have important consequences for

compliance with medical regimens; and (3) even if cost of care is not an issue, the attitude of significant others may influence individuals' compliant behavior (Becker and Green 1975).

Unfortunately, studies that showed that the health beliefs of significant others predicted the compliance of the patient, have limited the generalizability of the HBM. After all, the expectation has been that people who have had the responsibility for the health of a child, aged person, or disabled person, and who have already shown a tendency to fulfill that responsibility by entering the health care system, would be more likely than others in general to follow the dictates of a rational decision-making algorithm such as the HBM (Weisenberg, Kegeles, and Lund 1980).

It appears that much of the research on compliance behavior is moving away from the traditional medical model toward attitudinal and motivational models such as the HBM. In the words of Sir William Osler, "It is just as important to know what is in a man's head as what is in his chest, if you want to predict the outcome of his pulmonary tuberculosis" (Shahan 1972).

Summary

In reviewing the literature in which the HBM concepts were used to study compliant behavior, it appeared

that the HBM could be useful for explaining and understanding compliant health behavior. Despite the various methodological approaches and different populations studied, the single finding which consistently emerged was that individuals were more predisposed toward exhibiting compliant behavior if they subscribed to each of the concepts of belief in susceptibility to the disease, severity of the disease if contracted, and faith in the efficacy of the recommended medical regimen. However, after twenty years of research, the picture in regard to the causal connection between health beliefs and health behavior is still cloudy despite the relative abundance of correlational data in support of the HBM.

Other modifying factors apparently exist which have the potential to influence beliefs held by individuals. These factors are the "cues to action" (motivators) or barriers to care acquisition that individuals perceive to exist. Further questions remain to be answered; for example, "Does the predictive value of the HBM extend to younger age groups?"

Specific to tuberculosis infection, the nurse must be alert to indications of non-compliance. If the factors that increase compliant behavior can be identified, the nurse can carry out activities to change the behavior of non-compliant tuberculosis infected individuals. Keeping

tuberculosis infected individuals on their medication regimen is important in preventing them from developing the active disease and becoming infectious, thus spreading tuberculosis.

CHAPTER 3

METHODOLOGY

This chapter includes a description of the study design, the study setting, study sample, method of data collection used in conducting the study, and protection of human rights.

Study Design

This was a descriptive study designed to identify those factors individuals gave as reasons for continuing on a chemoprophylactic regimen for tuberculosis infection. It also investigated whether or not there was any relationship between perceived susceptibility, perceived severity, perceived benefit minus barriers (three concepts of the Health Belief Model [HBM]), and compliant behavior. Modifying factors of knowledge and general health behavior were also examined.

Study Setting

The study was conducted with individuals living within a county in the southwestern part of the United States. The investigator contacted the director of nursing service at the county health department, to describe the study and to ask permission to approach patients who

attended the Chest Clinic to participate in the study (see Appendix B for letter of permission). After permission to conduct the study was obtained, the medical director and nurse supervisor of the Chest Clinic were contacted for their approval (see Appendices C and D for letters of permission). A meeting was held with the nursing staff of the Chest Clinic to introduce the investigator and to explain the nature and purpose of this study.

The Chest Clinic was a nurse-managed clinic that was open Monday through Friday from 8:00 a.m. to 5:00 p.m.. Skin testing was done Monday through Wednesday, and sputums were collected Monday through Thursday. A physician was available for consultation every Thursday.

The clinic protocol stated that individuals with positive Purified Protein Derivative (PPD) skin test indurations who were under 35 years of age were to be advised to take one year of Isoniazid (INH) chemoprophylaxis. For individuals who were 35 years of age or older and who were positive tuberculin reactors or converters, the risk of hepatitis precluded the routine use of INH chemoprophylaxis unless one or more risk factors such as diabetes, silicosis, post-gastrectomy, immunosuppressive therapy, or reticuloendothelial disease were present. According to the Pima County Health Department Screening Procedures Guideline (1975), contraindications to the

administration of INH were: (1) previous INH associated hepatic injury; (2) severe adverse reactions to INH; (3) acute liver disease; and (4) pregnancy. Individuals with significant positive PPD skin test indurations; that is, an induration of 10 mm or more in diameter at 48 hours following testing, were requested to have a chest x-ray.

The subjects in this study took only INH chemoprophylactically for tuberculosis infection. The INH was refilled on a monthly basis. Every Wednesday, the nurse-aide in the clinic pulled the medication cards of individuals who were overdue for medication refills. Letters were sent to these individuals reminding them to come to the clinic for medication pick-up. The following Wednesday, when overdue medication cards were pulled again, those persons who were still overdue were contacted by telephone. The general practice was for individuals to return monthly for a medication refill when their prescription was gone. No reminder letters or cards were sent prior to the medication refill date.

At the time of the study there were over 800 persons who were on antituberculosis medication. Approximately 650 of those individuals were either converters or reactors. The others who attended the clinic had active tuberculosis. According to the clinic staff, out of the total 800, on the average, there were about 40 individuals a week who forgot

to pick up their medication. These individuals were considered compliant until they had missed three consecutive months of chemoprophylaxis.

Study Sample

The sample population was chosen from the tuberculosis registry for individuals attending the local county Health Department Chest Clinic. The study sample consisted of 15 Mexican-American females and 15 Mexican-American males who met the following criteria: (1) had been infected with tuberculosis and were experiencing no acute symptoms from other health problems; (2) were in the sixth through twelfth month of chemoprophylactic treatment at the time of the study; (3) were between 21 and 65 years of age; (4) were primarily responsible for their own care; (5) were living within the county; (6) had a Spanish surname and self described themselves as Mexican-American; and (7) were able to read, speak, and write English.

The investigator chose only Mexican-American individuals because they represented the largest population being treated for tuberculosis infection at the county Chest Clinic. Names of persons were selected from the tuberculosis registry on the basis of Spanish surname. For those individuals with Spanish surnames, the investigator reviewed the tuberculosis registry information to determine whether or not they met the study sample criteria.

Research Tool

The questionnaire developed by the investigator based on a review of the literature was divided into three parts: demographic information; health beliefs (from the HBM) and knowledge about tuberculosis; and general information about the subject's health behavior.

The questionnaire statements were tested with five graduate students. A statement was considered to address the content it was intended to test if three out of five graduate students agreed on its content. Reliability of the questionnaire was unknown as the questionnaire had never been utilized prior to this study.

Pretesting of the data collection questionnaire was conducted with three female subjects whose names were obtained from the tuberculosis registry. The three female subjects met all the criteria for selection except they had completed the one year of INH chemoprophylaxis one month prior to the initiation of data collection for this study.

The pretesting was conducted to determine the amount of time the subjects would require to complete the questionnaire as well as to determine if statements were understood. The average amount of time needed to complete the questionnaire was eighteen minutes. No revisions were needed in the wording of the questionnaire statements.

The questionnaires were numbered consecutively. The questionnaire number and the subject's clinic record file number were matched on a list separate from the questionnaire. The list identifying the subject by name was kept in the investigator's possession. After completing the questionnaire, the subject was thanked for participating in the study.

Demographic Information

Part 1 of the questionnaire included three questions. These questions were developed to obtain information about the subject's age, sex, and size of the tuberculin skin test induration.

Health Beliefs

Part 2 of the questionnaire included 26 statements designed to collect data on the three areas of the HBM being investigated in this study: perceived susceptibility, perceived severity, and perceived benefits minus perceived barriers. Each of these HBM concepts was categorized as a subscale of the total Health Beliefs scale of 26 statements. Each statement was assigned a score value of two for the response in the expected direction and a score value of one if the response was in the opposite direction. The possible range of scores for the Health Beliefs scale was 26 through 52.

The Perceived Susceptibility Subscale included six items: numbers 17, 22, 29, 30, 35, and 36. The possible range of scores for this subscale was six through twelve with the higher score indicating a higher level of perceived susceptibility to contracting active tuberculosis.

The Perceived Severity Subscale included eight items: numbers 15, 16, 25, 28, 31, 32, 33, and 37. The possible range of scores for this subscale was eight through sixteen, with the higher score indicating a higher level of perceived severity about the consequences of contracting active tuberculosis.

The Perceived Benefits Minus Barriers Subscale included fourteen items. Benefits were measured by two items, numbers 19 and 20. Items 1 through 12 assessed what barriers the subjects perceived existed in seeking care. The possible range of scores was 12 through 24. The higher score indicated fewer perceived barriers by the subject and belief in the efficacy (benefit) of the treatment regimen.

Knowledge. There were six items, numbers 13, 14, 21, 24, 26, and 27, in the questionnaire to measure the subject's level of knowledge about the skin test, rationale for taking INH, and the way tuberculosis spreads. The possible range of scores for these six items was six through twelve, with the higher score indicating a higher level of knowledge about tuberculosis.

General Information

Part 3 of the questionnaire contained eight general statements (item numbers 38 through 45) designed to obtain information about the subject's health behavior, a variable found to have an effect on compliant behavior in a previous study (Kegeles 1963). These behaviors included: concern about health, willingness to seek early medical care, yearly physical examinations, faith in treatment received from doctors, always following doctors' orders, and use of daily drugs other than INH. Items 44 and 45 required verbal responses by the subjects about the medications they were currently taking.

Thirty-six of the statements allowed the subject to make one of two choices: agree or disagree. Two statements, item 35 ("After you were told about your positive skin test reaction, did you think you might get active tuberculosis within the next year?") and item 36 ("After you were told about your positive skin test reaction, did you think you might get active tuberculosis within the next five years?"), required the subject to respond with "yes" or "no." Statement 37 ("How physically sick do you think you would be if you were to get active tuberculosis?") required the subject to respond "very sick," "sick," or "not sick at all."

There were four open-ended questions in the questionnaire. Item 12 (barriers) was designed to generate specific problems the subjects perceived to exist which interfered with their ability to come to the clinic. Item 18 was designed to determine the motivating factor behind the subject's decision to obtain a skin test. Item 23 was asked to answer the first statement of the problem about the motivating factors which influenced the subjects to continue to take INH. The last open-ended question, item 34, was designed to obtain information regarding what the subjects perceived as possible courses of action to take to prevent one's acquiring active tuberculosis.

Data Collection

Sixty-six females and 28 males with Spanish surnames were initially selected by the investigator from the tuberculosis registry. The investigator asked the clinic nurses to screen the list and verify which individuals were Mexican-American and whether or not they could speak English. Those individuals requiring a translator were excluded. After the clinic staff screened the list of names, 46 females and 22 males were selected as possible candidates for participation in the study.

The chart record file number for each individual was written on a small piece of paper, folded, and placed in a basket. The chart record file numbers were separated

into female and male categories. Thirty numbers were randomly selected, 15 from the basket containing female chart record file numbers and 15 from the basket containing male chart record file numbers. These 30 individuals became the sample of compliers. If an individual refused to participate, another number was selected from the appropriate basket.

The investigator first attempted to contact the subjects by telephone. In instances where a telephone number was not available, one or more home visits were made. Postcards were left at the home of possible participants if they were not home, asking that they contact the investigator if they were interested in participating in the study. A brief explanation of who the investigator was and the nature of the study were provided on the postcard. The investigator then made a repeat home visit in two days. All of the home visit contacts agreed to participate in this study.

When a telephone contact was made, the investigator introduced herself and gave a brief verbal description of the nature and purpose of the study. The subjects were informed that no hazards were involved, participation was entirely voluntary, and refusal to participate would in no way affect their health care at the Chest Clinic. It was explained that the questionnaire would take approximately

twenty minutes to complete. Once verbal permission was obtained, an appointment was made with the individual for a home visit. All subjects preferred to complete the questionnaire in their home; thus, no clinic arrangements had to be made. One male individual refused to participate because he did not want to be bothered in the evening after work.

The investigator answered any questions the participant had both before and after completing the questionnaire. In addition, further teaching about tuberculosis was provided to those individuals requesting more information.

Protection of Human Rights

The human rights of the subjects involved in this study were protected according to the guidelines of the University of Arizona Human Subjects Committee. The subjects were informed as to the intent of the study and the questionnaire carried a disclaimer stating that completion of the questionnaire indicated consent to participate in the study (see Appendix E). Data were collected only after approval was given by the University of Arizona Human Subjects Committee (see Appendix F).

CHAPTER 4

PRESENTATION AND ANALYSIS OF DATA

This chapter presents the analysis of the data. The findings related to the demographic information about the sample and the Health Belief Scale are revealed. Also presented are the General Information data and open-ended question responses.

Demographic Information

Age, Sex, and Ethnicity

The sample consisted of 30 Mexican-American individuals, 15 females and 15 males. The reported ages of the 30 subjects ranged from 21 to 57 years. The mean age was 34.2 years with a median age of 33.1 years. Four (13.3 percent) of the subjects were under 30 years of age. Twenty-two (73.3 percent) of the subjects were under 40 years of age. Two (6.7 percent) subjects were under 50 years of age, and two (6.7 percent) subjects were under 60 years of age.

Induration Measurements for Skin Tests with Purified Protein Derivative (PPD)

The size of induration with PPD skin test of the sample subjects ranged between 10 mm. and 60 mm. The mean

induration measurement was 22.2 mm. with a median induration measurement of 15.5 mm. Eight (26.7 percent) of the subjects had indurations of 15 mm. in size. Seven (23.3 percent) of the subjects had induration measurements less than 15 mm. and 15 (50 percent) of the subjects had induration that measured greater than 15 mm.

Description of Questionnaire Items

A forty-six item questionnaire (see Appendix E) was used for data collection. Twenty-six items comprised the Health Belief Scale which was used to determine whether or not subjects subscribed to the Health Belief Model (HBM) concepts of: (1) perceived susceptibility; (2) perceived severity; and (3) perceived benefits minus barriers. Each of these HBM concepts formed a subscale of the total Health Belief Scale. Individual subscale responses were examined.

Knowledge about tuberculosis was also assessed to determine if it might have influenced how subjects subscribed to the HBM concepts. A knowledge scale consisting of six items was included in the section with the Health Belief items. Another modifying factor examined was the category, "General Information," which consisted of eight items. For this category, individual responses were examined.

There were four open-ended questions included in the questionnaire. One of these questions measured

barriers, and the other three questions collected information about motivating factors that influenced the individual's compliant behavior.

Health Belief Scale Responses

The analysis of the component areas of the Health Belief Scale focused on the subscales for each of the three HBM concepts: perceived susceptibility, perceived severity, and perceived benefits minus barriers. The scores for the subscales were derived by calculating the sum total of each item in the subscale. If the subject answered in the desired direction, two points were given; if the subject answered in the opposite direction, one point was allotted. Appendix G lists the items for each subscale and indicates whether each item had a positive or negative sentiment.

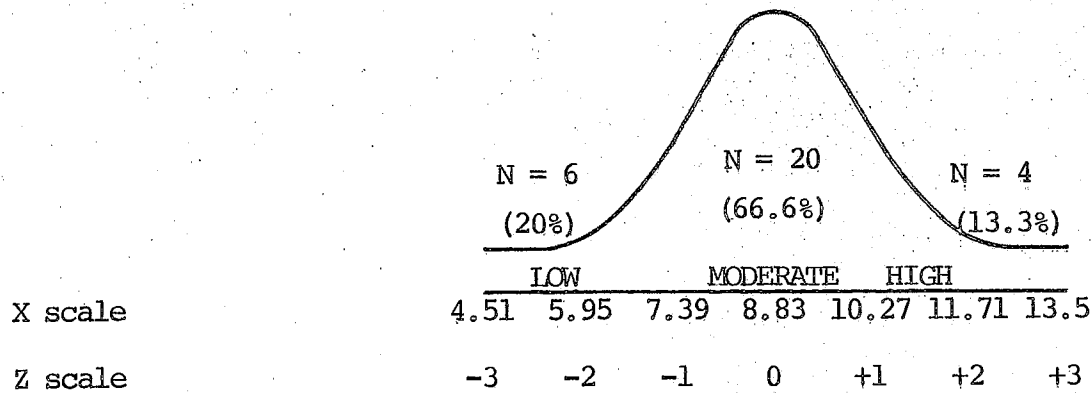
A mean score was calculated for each subscale along with its standard deviation. Those individuals scoring above one standard deviation from the mean were considered to have a "high" level of perception for that subscale. Scores within plus or minus one standard deviation of the mean score indicated a "moderate" level of perception. Scores that were below minus one standard deviation were considered to indicate a "low" level of perception by the individual for that particular subscale.

Perceived Susceptibility Subscale

Perceived susceptibility for contracting active tuberculosis was measured by six items: numbers 17, 22, 29, 31, 35, and 36. The possible range of scores was 6 through 12. The mean score for this subscale was 8.83 with a standard deviation of 1.44. Twenty (66.6 percent) of the subjects scored within the "moderate" range (8.83 ± 1.44) of perceived susceptibility. Six (20 percent) of the subjects scored below minus one standard deviation of the mean (scores below 7.39) implying "low" susceptibility. Four (13.3 percent) subjects scored above plus one standard deviation of the mean (scores above 10.27) indicating a "high" level of perceived susceptibility (see Figure 2).

Perceived Severity Subscale

Perceived severity of active tuberculosis was measured by eight items: numbers 15, 16, 25, 28, 31, 32, 33, and 37. The possible range of scores was 8 through 16. The subscale mean score was 12.7 with a standard deviation of 1.55. Twenty-two (73.3 percent) subjects scored within the "moderate" range (12.7 ± 1.55) for perceived severity, five (16.6 percent) subjects scored "low" (scores below 11.15), and three (10 percent) subjects scored "high" (scores above 14.25) perceived severity (see Figure 3).



Subjects' Actual Raw Scores:

6 points = N = 1 subject (s)
 7 " = N = 5 "
 8 " = N = 8 "
 9 " = N = 4 "
 10 " = N = 8 "
 11 " = N = 4 "

N = 30 subjects

$\bar{x} = 8.83$

Standard deviation = 1.44

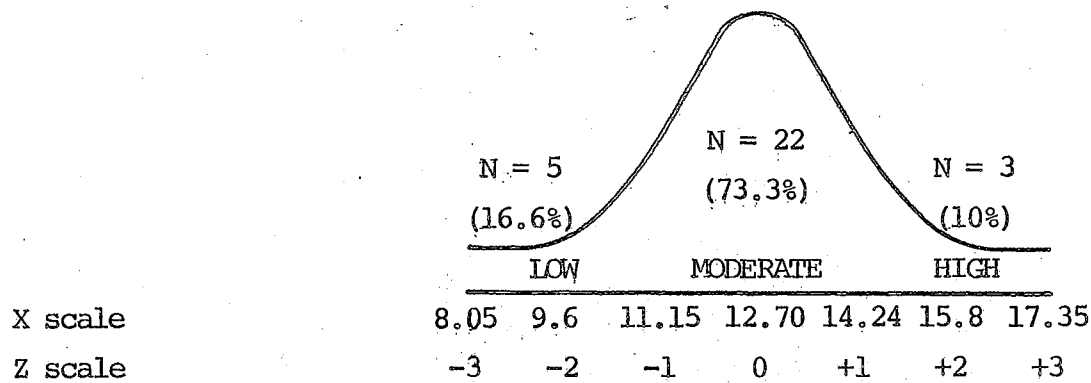
Range of scores = 6-12

$\bar{x} \pm 1$ standard deviation = moderate level of perceived susceptibility

Greater than +1 standard deviation = high level of perceived susceptibility

Less than -1 standard deviation = low level of perceived susceptibility

Figure 2. Subjects' Perceived Susceptibility of Contracting Active Tuberculosis.



Subjects' Actual Raw Scores:

9 points = N = 1 subject(s)
 10 " = N = 3 "
 11 " = N = 1 "
 12 " = N = 7 "
 13 " = N = 8 "
 14 " = N = 7 "
 15 " = N = 3 "

N = 30 subjects

$\bar{x} = 12.7$

Standard deviation = 1.55

Range of scores = 8-16

$\bar{x} \pm 1$ standard deviation = moderate level of perceived severity

Greater than +1 standard deviation = high level of perceived severity

Less than -1 standard deviation = low level of perceived severity

Figure 3. Subjects' Perceived Severity of Active Tuberculosis.

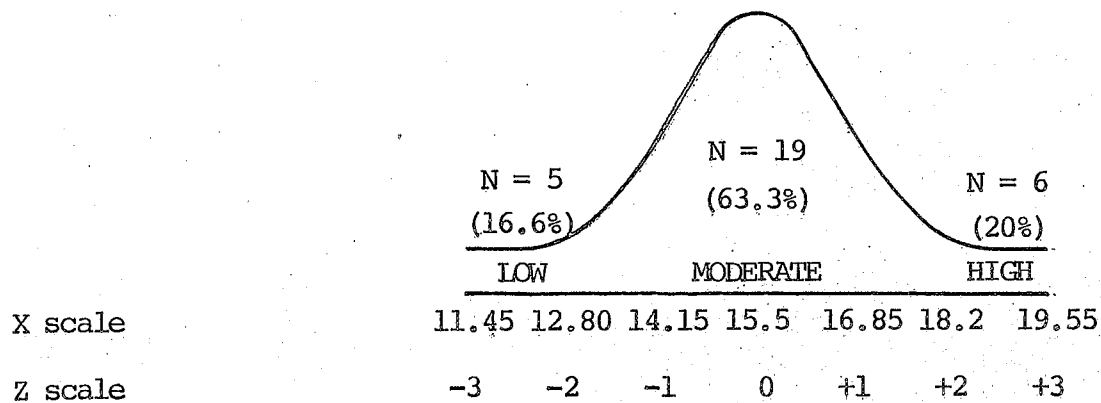
Perceived Benefits Minus
Barriers Subscale

Two statements, item numbers 19 and 20, addressed whether or not the subjects perceived any benefit from taking INH. The possible range of scores was 2 through 4. The mean score for these two statements was 3.8. Twenty-four (80 percent) of the subjects scored 4, and six (20 percent) scored 3.

Ten items were asked to determine subjects' perception regarding barriers to obtaining care. These items included numbers 1 through 4, 6 through 10, and 11. The possible range of scores was 10 through 20. For this subscale, the scores were categorized into "low," "moderate," and "high" degrees of ease in obtaining care. The mean score was 15.5 with a standard deviation of 1.35. Nineteen (63.3 percent) of the subjects scored within the "moderate" range (15.5 ± 1.35) of ease in obtaining care, while six (20 percent) of the subjects scored "high" (scores above 16.85), and five (16.6 percent) subjects scored "low" ease (scores below 14.15) in obtaining care (see Figure 4).

Knowledge

The subjects' knowledge about tuberculosis was measured by six items: numbers 13, 14, 21, 24, 26, and 27. The possible range of scores was 6 through 12. The mean score for this subscale was 10.90 with a standard deviation



Subjects' Actual Raw Scores:

13 points = N = 1 subject(s)

14 " = N = 4 "

15 " = N = 14 "

16 " = N = 5 "

17 " = N = 4 "

19 " = N = 2 "

N = 30 subjects

\bar{x} = 15.50

Standard deviation = 1.35

Range of scores = 10-20

$\bar{x} \pm 1$ standard deviation = moderate ease
in obtaining care

Greater than +1 standard deviation = high
ease in obtaining care

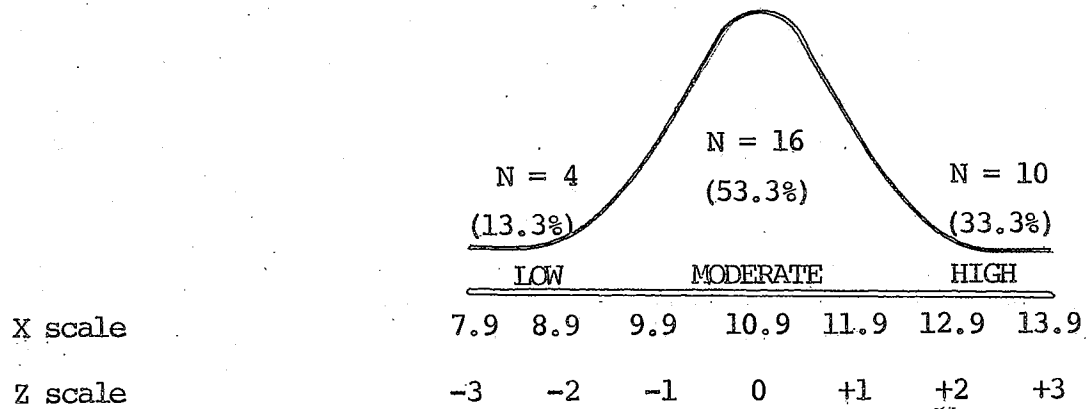
Less than -1 standard deviation = low ease
in obtaining care

Figure 4. Subjects' Perceived Ease in Obtaining Care (Absence of Barriers).

of 1.09 (see Figure 5). Sixteen (53.3 percent) of the subjects scored within the range of "moderate" (10.90 ± 1.09) degree of knowledge. Ten (33.3 percent) of the subjects scored 12, indicating "high" degree of knowledge about tuberculosis (scores above 11.9). Four (13.3 percent) individuals scored below minus one standard deviation (scores below 9.9), indicating "low" knowledge about tuberculosis.

Pearson Product Moment Correlation Coefficients revealed no significant differences between any of the variables of age, sex, and size of PPD skin test induration with the HBM subscales: (1) perceived susceptibility; (2) perceived severity; and (3) perceived benefits minus barriers. Age correlated with knowledge with a Pearson Product Moment Correlation Coefficient of .5353 which was significant at the .002 level. This finding showed that older individuals in this study had more knowledge regarding tuberculosis than did younger individuals.

A Student t-Test (Roscoe 1975) was used to determine whether or not any significant difference existed between women and men and their level of knowledge about tuberculosis. No significant difference ($P = .249$) was found between the two groups in their level of knowledge.



Subjects' Actual Raw Scores:

8 points = N = 1 subject(s)
 9 " = N = 3 "
 10 " = N = 4 "
 11 " = N = 12 "
 12 " = N = 10 "

N = 30 subjects

$\bar{x} = 10.90$

Standard deviation = 1.09

Range of scores = 6-12

$\bar{x} \pm 1$ standard deviation = moderate degree of knowledge

Greater than +1 standard deviation = high degree of knowledge

Less than -1 standard deviation = low degree of knowledge

Figure 5. Subjects' Level of Knowledge about Tuberculosis.

General Information

This category consisted of eight items, numbers 38 through 45, designed to elicit information about various factors that could modify or influence individuals' health beliefs and perceptions. Individual item responses were:

- Item 38: Twenty-four (80 percent) of the subjects agreed they thought about their health even when not sick.
- Item 39: Twenty-two (73.3 percent) of the subjects indicated that they go to see a doctor whenever they have been sick for more than a week.
- Item 40: Sixteen (53.3 percent) of the subjects reported they had yearly physical examinations and fourteen (46.7 percent) denied having yearly physical examinations.
- Item 44: Twenty (66.7 percent) of the subjects believed that their doctors have taken good care of them while ten (33.3 percent) subjects disagreed.
- Item 42: Twenty-five (83.3 percent) of the subjects indicated that they always follow their doctors' orders.
- Item 43: Nine (30 percent) of the subjects took other pills in addition to INH on a daily basis.

The number of medications currently taken by each subject was obtained (items 44 and 45) in order to determine if compliant behavior might have been influenced by the subject taking other required medications on a daily basis. This factor did not help to explain the compliant behavior for individuals in this sample. Nineteen (63 percent) of the subjects reported taking no medications other than INH. Of the remaining eleven individuals who reported taking additional medications, only nine (30 percent) took the additional medication on a daily basis.

There were four open-ended questions, item numbers 12, 18, 23, and 34. The responses to these items were:

Item 12: Twenty-four (80 percent) of the subjects stated "nothing" would make it easier for them to come to the clinic.

Item 18: Thirteen (43.3 percent) of the subjects had skin tests done as a condition of employment; two (6.7 percent) asked to have a skin test; and ten (33.3 percent) were advised by a doctor or nurse to have the skin test.

Item 23: The major motivating factor identified by the subjects for taking INH was their desire to prevent the development of active tuberculosis. This motivating factor was reported by thirteen (43.33 percent) of the subjects.

Item 34: Fifteen (50 percent) of the subjects responded that persons can reduce their chance of acquiring active tuberculosis by taking INH pills as prescribed. Seven (23 percent) suggested persons should see a doctor and twelve (16.66 percent) advised having regular check-ups.

CHAPTER 5

DISCUSSION, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

The purpose of this study was to identify reasons individuals continued on a twelve month chemoprophylaxis regimen for tuberculosis infection. The investigator was also interested in finding out if the concepts of the Health Belief Model (HBM), knowledge, and certain general health behavior had any relationship with compliant behavior. Discussion of these findings in relation to the conceptual framework and literature are presented. Conclusions, implications, and recommendations for further study were made based upon the interpretation of the findings.

Findings

Health Belief Scale

The Health Belief Model (HBM) formulated by Hochbaum et al. (1958) was used as the conceptual framework in the study. The principles of the HBM examined were:

- (1) perceived susceptibility to contracting active tuberculosis;
- (2) perceived severity of active tuberculosis;
- and (3) perceived benefits minus barriers to obtaining

care. The HBM suggested that individuals who held these three beliefs were more likely to comply with recommended medical regimens than those not holding these beliefs.

In this study, the score for the HBM subscales did not indicate "high" adherence by the subjects to the beliefs of the HBM. Only 5 (26.6 percent) subjects held "high" beliefs on both perceived susceptibility and perceived severity. However, the score for HBM subscales did not show lack of adherence by the subjects to the HBM concepts. In each HBM subscale, the "moderate" range of perception comprised the highest number of subjects. In the Perceived Susceptibility Subscale the "moderate" range of perception included 20 (66.6 percent) subjects; the Perceived Severity subscale included 22 (73.3 percent) subjects; and the Perceived Benefits minus Barriers Subscale had 19 (63.3 percent) subjects in the "moderate" range of perception. Thus, in answer to the second statement of the problem, the study sample did subscribe to the concepts contained in the HBM.

Failure of the study sample to have a "high" level of adherence to the HBM concepts was a finding contrary to evidence provided in other studies which have used the HBM to predict compliant behavior (Becker et al. 1977; Becker and Green 1975). Perhaps, as this study has revealed, a "high" level of adherence is not always necessary for compliant behavior to occur. A "moderate" level of adherence

to the HBM concepts might also be predictive of compliant behavior.

Twenty-six (86.6 percent) of the subjects scored at the mean or above plus one standard deviation of the mean for the knowledge scale, indicating a "moderate" to "high" degree of knowledge about tuberculosis existed among the study subjects. This reported degree of knowledge about tuberculosis may have affected the level of perception held by the subjects to the HBM concepts. The nursing staff may have taught the individuals the needed information to allay their anxieties about the susceptibility and severity of tuberculosis. The nurses stressed to clinic patients that active tuberculosis could be prevented with one year of INH chemoprophylaxis.

Marston (1970), in her review of the literature regarding compliance with medical regimens, reported that knowledge about an illness and its treatment did not necessarily lead to compliance. This study found that knowledge was high among the sample, a relationship that suggests patients' understanding about their illness and treatment regimen may have had an influence on compliance for the subjects in this study.

General Health Behavior

Twenty-one (71.3 percent) of the subjects answered the category of general statements related to health

behavior in the desired direction. These individuals stated that they thought about their health even when they were not sick, sought medical attention early, obtained annual physical examinations, believed that they had always received good care, and admitted to always following their doctors' advice. This finding supported the results of Weisenberg's et al. (1980) and Frankel and Hovell's (1978) work where they found that non-belief variables (for example, clinic location and friendliness of staff) should be considered when attempting to predict or explain compliant behavior, a finding consistent with this study.

"Moderate" support for the HBM in this study suggests that other variables might have influenced the compliant behavior found in this sample. Some of these variables may have included client satisfaction of availability of health services, free services, quality of care, attitudes of health care personnel, past experience with health care services, and influence of others telling the individuals that they should be taking their medication.

Conclusions and Implications

The major factor cited by the subjects as the key motivator behind their continued compliance to the recommended chemoprophylactic regimen was their desire to prevent the development of active tuberculosis. The findings related to the HBM indicated that the extent to which the

study subjects subscribed to the beliefs contained in the HBM was at a "moderate" level of perception. A moderate to high degree of knowledge was shown to exist by a majority of the subjects (86.6 percent). This variable, as well as other general health behaviors which were shown to exist, suggested that other factors might be responsible for the compliant behavior exhibited in the sample.

This study has implications for the nurse and other health professionals attempting to improve their clients' compliance with recommended treatment regimens. The state of the art for compliance studies has been to focus on sociodemographic variables to explain why individuals are not complying with recommended treatment regimens. Perhaps, as this study's findings and those of Haefner and Kirscht (1970) suggest, the focus might include increasing individuals' understanding about their recommended treatment regimen.

Knowledge was found to be high in this study's compliant sample. A possible implication of this finding is that clients may handle medical explanations better than health professionals have believed. Perhaps readiness to follow preventive health practices could be increased by increasing individuals' knowledge about their illness and its treatment. Another implication could be that the clinic nurses were doing a good job teaching individuals

about tuberculosis prevention. As Haefner and Kirscht (1970) were able to demonstrate, it is possible to modify perceived susceptibility and severity of a disease through teaching, and that such modification can lead to change in health behavior.

Interestingly, in this study, knowledge about tuberculosis may simultaneously have decreased individuals' anxieties about susceptibility and severity of tuberculosis while increasing their compliance. All subjects learned that failure to comply would result in the development of active tuberculosis and this was the key motivating factor identified by thirteen (43.33 percent) of the subjects as the factor influencing their decision to continue on the medication regimen. Further assessment of non-belief variables may provide evidence to alert the nurse and other health care professionals to those factors responsible for compliant behavior.

The literature review revealed studies that had supported the HBM at a "high" level of perception. In this study, it was revealed that the sample of compliers had a "moderate" level of perception and still complied with the recommended treatment regimen. A problem inherent with the reported data was that further testing of the study instrument was needed to determine its reliability and validity. Another variable that may have confounded the results of

the study was that of the client-provider relationship, which has been shown in previous research to influence compliant behavior (Dudley 1979).

Understanding the problem of compliance is not an easy or clear task. Many unidentified variables and their relationship to one another probably exist which influence compliance. Also, the actual degree of adherence to the HBM concepts remains questionable. For example, "high" adherence to the HBM concepts may not be necessary in all instances of compliant behavior. A "moderate" level of perception in association with certain general health behavior may also be indicative of compliance.

Recommendations for Further Study

Based on the findings of this study, the following recommendations for further research were made:

1. Test the questionnaire for reliability and validity and then replicate the study.
2. Replicate the study with individuals of a different ethnic background to test the cross-cultural generalizability of the questionnaire.

CHAPTER 6

SUMMARY

This was a descriptive study designed to answer the following questions:

1. What factors influence an individual's decision to continue on a medication regimen for tuberculosis infection?
2. Do compliant individuals subscribe to the following three concepts contained within the Health Belief Model:
 - a. feel susceptible to contracting active tuberculosis?
 - b. perceive that to contract active tuberculosis would result in serious repercussions?
 - c. perceive that the recommended medication regimen will be effective (benefit) regardless of the barriers encountered, if any, in obtaining care?
3. Is there a relationship between knowledge about tuberculosis and the individual's perception toward the three HBM concepts?
4. Is there a relationship between general health behavior and compliant behavior?

The purpose of this study was to identify factors individuals gave as their reasons for continuing on a twelve month chemoprophylactic regimen after being told they were infected with tuberculosis. The study was also done to determine whether or not there was any relationship between the concepts of the HBM and compliant behavior. The modifying factors, of knowledge and general health behavior, were examined to determine their relationship, if any, to compliant behavior.

The conceptual framework for this study was based on the HBM formulated by Hochbaum et al. (1958). The major concepts of the HBM include and suggest that individuals who: (1) feel susceptible to contracting a disease; (2) believe the disease can have serious repercussions; (3) believe the treatment regimen will be effective and see no major obstacles or barriers to treatment accessibility are more likely to comply with recommended medical regimens than those not holding these beliefs.

Thirty subjects participated in the study and completed questionnaires. Fifteen were female and fifteen were male. The sample consisted of Mexican-American individuals. The mean age of the subjects was 34.2 years.

Data were collected utilizing a three part, forty-five item questionnaire developed by the investigator based on a review of the literature. The first part asked for

demographic information, the second part focused on the individual's health beliefs and knowledge about tuberculosis, and the third part gathered general information about the subject's health behavior. Data were analyzed and pertinent data were reported in figures.

Analysis of data revealed that the key motivator behind subjects' decision to continue on the medication regimen was their desire to prevent the development of active tuberculosis. The subjects in this study reported a "moderate" level of perception to the concepts of the HBM. Thus, individuals in this study did subscribe to the beliefs contained in the HBM. Twenty-six (86.6 percent) of the subjects scored "moderate" to "high" in knowledge about tuberculosis. Twenty-one (71.3 percent) of the subjects answered the general health behavior category in the desired direction indicating that a positive relationship may exist between general health behavior and compliant behavior.

Implications for health care workers were derived from the study findings. The primary implication was the need to examine non-belief variables, such as knowledge, in addition to health beliefs. The HBM alone could not be used to explain the compliant behavior witnessed in this study's sample. Recommendations for further studies on the topic of compliance also were made. These

recommendations included the refinement of the questionnaire tool and replication of the study.

APPENDIX A

REINFORCING CUES AND CONSEQUENCES

AVERSIVE CUES AND CONSEQUENCES

A behavioral flow chart illustrating possible reinforcing cues and consequences which might increase the probability of appointment keeping.

Schedule Appointment

friendly phone contact
convenient appointment slot
visit process explained

short wait
reminder mailed/phoned
weather good
available leave from work
available baby-sitting

Transportation

available
reimbursed for transportation
good parking
clinic easy to find

Registration at Clinic

easy to find registration desk
polite and cheerful personnel
easy to fill out forms
cheery hello

Waiting

short wait
comfortable waiting room

Appointment

familiar doctor
polite, professional, competent personnel
procedures explained, questions answered
medical procedures not frightening
discomfort kept to a minimum

Re-registration for future appointments

polite personnel
convenient appointment slot
reason for return visit explained
appointment slip given
costs of medical services commensurate with ability to pay
"reward" for kept appointment (discount on medical charges, etc.)

Departure

cheery goodbye
transportation home is convenient
symptoms have subsided

Taken from Frankel and Hovell (October 1978).

A behavioral flow chart illustrating possible aversive cues and consequences which might decrease the probability of appointment keeping.

Schedule Appointment

bad phone contact
inconvenient appointment
slot
inadequate clinic services

long wait
forget appointment
weather poor
have to arrange sick leave
have to arrange baby-
sitting

Transportation

unavailable
too expensive
hard to find clinic
parking inadequate

Registration at
Clinic

hard to find registration
desk
lengthy forms to fill out
rude personnel

Waiting

wait too long
uncomfortable waiting room

Appointment

unknown doctor
rude personnel
unprofessional and
incompetent personnel
medical processes
frightening
medical processes painful

Re-registration for
future appointments

rude personnel
inconvenient appointment
slot
reason for return visit
not explained
cost of return visit too
expensive
have to pay for medical
services

Departure

no goodbye
transportation home is
inconvenient
have to pick up children
and pay baby-sitter
symptoms still persist

APPENDIX B

CONSENT FORM FOR DIRECTOR OF NURSES

July 11, 1980

Ms. Betty J. Spaulding
 Director of Nursing
 Pima County Health Department
 Tucson, Arizona

Dear Ms. Spaulding:

I am a candidate for the Master of Science Degree in Nursing at the University of Arizona College of Nursing. I am presently working on my thesis research study entitled, "Compliance with a Medical Regimen for Infectious Tuberculosis: A Test of the Health Belief Model." As we discussed, the purpose of the study is to identify those factors individuals cite for continuing in a twelve-month chemoprophylactic regimen for infectious tuberculosis and to test the utility of the Health Belief Model as a tool for predicting compliant behavior. The perceptions and beliefs that make up the Health Belief Model have been demonstrated to be alterable, thus, by knowing which model components are below a level presumed necessary for compliance, the nurse may be able to tailor an intervention to suit the particular needs of each patient.

I would like permission to conduct my thesis research in the Chest Clinic. I would be screening records and selecting thirty individuals who meet my sample criteria to be interviewed. The interviews will take place either in the clinic or the individual's home.

Please indicate your approval by signing below and returning this letter to me. Thank you very much.

Sincerely,

Veronica A. Giron, R.N.
 Veronica A. Giron, R.N.

Director of Nursing, P.C.H.D.
 consent given:

Betty Jane Spaulding

Date: 11 July 1980.

This has been approved by Ms. V. Taylor Chest Clinic.

APPENDIX C
CONSENT FORM FOR PHYSICIAN

I have given my permission to Veronica A. Giron, R.N., to conduct her research study in the Chest Clinic of the Pima County Health Department and to contact individuals listed on the tuberculosis register. I realize that a chart review will be done and an interview will be conducted with participants during a home visit or clinic visit to identify those factors which influence them to continue in a twelve-month chemoprophylactic regimen for infectious tuberculosis.

The nature, demands, risks, and benefits of the study have been explained to me. In addition, the investigator must obtain written permission from the individual participants.

Signature of Physician

J. P. Browning MD

Date

7/11/80

APPENDIX D

CONSENT FORM FOR CHEST CLINIC NURSE SUPERVISOR

I have given my permission to Veronica A. Giron, R.N., to conduct her research study in the Chest Clinic of the Pima County Health Department and to contact individuals listed on the tuberculosis register. I realize that a chart review will be done and an interview will be conducted with participants during a home visit or clinic visit to identify those factors which influence them to continue in a twelve-month chemoprophylactic regimen for infectious tuberculosis.

The nature, demands, risks, and benefits of the study have been explained to me. In addition, the investigator must obtain written permission from the individual participants.

Supervisor's Signature

Virginia M. Taylor

Date

July 11, 1980

APPENDIX E

COPY OF STUDY QUESTIONNAIRE

QUESTIONNAIRE DISCLAIMER

Study Title: Compliant Behavior among Individuals Infected
with Tuberculosis

I am asking for your voluntary participation in the completion of this questionnaire. The purpose of this study is to identify the reasons why you choose to continue to come to the Chest Clinic. The information gathered will help the nurses in their efforts to encourage other individuals with a positive skin test to remain in the treatment program.

You will be giving your consent by answering the statements. There will be no costs or risks to you from your participation in this study. A benefit to you will be the opportunity for health education about tuberculosis. You are asked only to fill out the questionnaire, which will take about twenty minutes of your time.

You are free to withdraw from the study at any time without affecting your health care in any way. If you have any questions about the questionnaire I will be available to answer them.

All information will be kept confidential. Names and addresses are not on the questionnaire. Your answers will be grouped with the answers of other people in the study. The data will be used for purposes of the study, future publication, study replication, and the findings will be presented to groups of health professionals.

A summary of the findings will be available to you upon request.

Veronica A. Giron, R.N.
Graduate Student
College of Nursing,
University of Arizona

Subject ID# _____

Date _____

Part II: Health BeliefsQuestionnaire Instructions:

This questionnaire contains a number of statements about the Chest Clinic, tuberculin skin test, Isoniazid (INH) medication, and tuberculosis. I would like you to tell me whether you agree or disagree with each statement. Please circle the choice that best describes your option. Ask me about any statements that you do not understand.

Below is an example of the statements you will find in this questionnaire along with the two choices of answers.

"Tuberculosis medications
are refilled every months."

Agree Disagree

The circled answer means that you agree with the statement.
Your identity will be kept strictly confidential.

Thank you for your participation.

Subject ID# _____

Part II: Health Beliefs

THE FOLLOWING STATEMENTS ARE ABOUT YOUR CLINIC VISITS. I WOULD LIKE TO KNOW IF YOU AGREE OR DISAGREE WITH EACH OF THE STATEMENTS. PLEASE CIRCLE THE CHOICE THAT BEST DESCRIBES YOUR OPINION ABOUT THE CLINIC.

- | | | |
|---|-------|----------|
| 1. It's easy to come to the clinic to pick up my INH pills. | Agree | Disagree |
| 2. Getting a ride to the clinic is not a problem. | Agree | Disagree |
| 3. The nurses are helpful. | Agree | Disagree |
| 4. Too much time is spent waiting to be seen at the clinic. | Agree | Disagree |
| 5. Someone has to pick up my INH pills at the clinic and bring them to me. | Agree | Disagree |
| 6. Getting a ride to the clinic takes time. | Agree | Disagree |
| 7. The clinic is set up so that you never have to wait a long time to be seen. | Agree | Disagree |
| 8. It's hard to come to the clinic to pick up my INH pills. | Agree | Disagree |
| 9. No matter how long you have to wait to be seen at the clinic, it's worth the wait. | Agree | Disagree |
| 10. The nurses aren't as helpful as they should be. | Agree | Disagree |
| 11. More clinic locations are needed in this area. | Agree | Disagree |
| 12. What would make it easier for you to come to the clinic?
(USE THE SPACE BELOW TO WRITE DOWN YOUR ANSWER) | | |

Subject ID# _____

THE STATEMENTS AND QUESTION IN THIS SECTION ARE ABOUT THE TUBERCULIN SKIN TEST. AFTER READING EACH STATEMENT, PLEASE CIRCLE WHETHER YOU AGREE OR DISAGREE WITH THE STATEMENT.

13. The purpose of the skin test is to detect the presence of the tuberculosis germ. Agree Disagree
14. A positive skin test reaction by itself means that a person has active tuberculosis. Agree Disagree
15. A positive skin test reaction is a serious matter. Agree Disagree
16. So many other things happen to be that I don't worry about my positive skin test. Agree Disagree
17. If a person has a positive skin test reaction, it's okay to wait six months before starting treatment. Agree Disagree
18. Why did you have a skin test done? (CHECK ONLY ONE RESPONSE)

_____ 1 A doctor or nurse advised me to have the skin test.

_____ 2 I asked to have the skin test done.

_____ 3 The skin test was done as part of a physical examination.

_____ 4 The skin test was done as a condition of employment.

_____ 5 Other (Explain _____)

Subjects: ID# _____

THE STATEMENTS AND QUESTION IN THIS NEXT SECTION ASK ABOUT YOUR INH PILLS. I WANT TO KNOW IF YOU AGREE OR DISAGREE WITH EACH STATEMENT. PLEASE CIRCLE THE WORD THAT DESCRIBES YOUR OPINION.

19. Taking INH every day for one year prevents a person from getting active tuberculosis. Agree Disagree
20. All persons infected with tuberculosis should take INH if they want to stay healthy. Agree Disagree
21. It is not necessary to take INH every day. Agree Disagree
22. Once a person has been infected with tuberculosis, he/she will develop active tuberculosis even though he/she is taking INH. Agree Disagree
23. What motivates you to take your INH every day? (USE THE SPACE BELOW TO WRITE DOWN YOUR ANSWER)

THE STATEMENTS AND QUESTION MADE BELOW ARE ABOUT TUBERCULOSIS. ANSWER EACH STATEMENT ACCORDING TO WHETHER YOU AGREE OR DISAGREE WITH THE STATEMENT. PLACE A CIRCLE AROUND THE WORD THAT MATCHES YOUR OPINION.

24. A person's chances of recovering completely from active tuberculosis are good. Agree Disagree

Subject ID# _____

25. A person with active tuberculosis can get well without seeing a doctor. Agree Disagree
26. Tuberculosis is spread by touching items a person with active tuberculosis has touched. Agree Disagree
27. Active tuberculosis cannot be cured. Agree Disagree
28. Active tuberculosis is not worse than a positive skin test reaction. Agree Disagree
29. Whenever I hear of someone getting active tuberculosis, I realize that I could also get active tuberculosis. Agree Disagree
30. I am more likely to get active tuberculosis than other people who have a positive skin test reaction. Agree Disagree
31. People with active tuberculosis have more lifestyle changes than people with infectious tuberculosis. Agree Disagree
32. Tuberculosis is the most serious infection I have ever had. Agree Disagree
33. A person infected with tuberculosis should be under the care of a doctor. Agree Disagree
34. What can a person do to reduce his/her chance of getting active tuberculosis? (USE THE SPACE BELOW TO WRITE DOWN YOUR ANSWER)

Subject ID# _____

THE NEXT TWO QUESTIONS REQUIRE EITHER A "YES" OR "NO" ANSWER. IF YOU ARE UNSURE ABOUT HOW YOU FEEL, MARK THE "MAYBE" ANSWER. PLEASE PLACE AN "X" BESIDE THE ANSWER YOU CHOOSE.

35. After you were told about your positive skin test reaction, did you think you might get active tuberculosis within the next year?

_____ 1 yes _____ 2 no _____ 3 maybe

36. After you were told about your positive skin test reaction, did you think you might get active tuberculosis within the next five years?

_____ 1 yes _____ 2 no _____ 3 maybe

37. How physically sick do you think you would be if you were to get active tuberculosis? (MARK AN "X" BESIDE THE ANSWER YOU CHOOSE)

_____ 1 very sick
_____ 2 sick
_____ 3 not sick at all

Subject ID# _____

Part III: General Information

THE LAST SECTION CONTAINS GENERAL STATEMENTS FOR YOU TO ANSWER. TELL ME IF YOU AGREE OR DISAGREE WITH EACH STATEMENT. PLEASE CIRCLE THE ANSWER THAT YOU CHOOSE.

- | | | |
|---|-------|----------|
| 38. Even when I am not sick, I think about my health. | Agree | Disagree |
| 39. Whenever I have been sick for more than a week, I go to see a doctor. | Agree | Disagree |
| 40. I have yearly physical examinations. | Agree | Disagree |
| 41. All my doctors have taken good care of me. | Agree | Disagree |
| 42. I always follow my doctor's orders. | Agree | Disagree |
| 43. I take other pills every day besides my INH pills. | Agree | Disagree |

I would like to ask you a couple of questions about your medications (including over the counter).

44. Please tell me the names of all medications that you are now taking for any condition.
- a.
 - b.
 - c.
 - d.

Subject ID# _____

45. How often do you take each of these medications?

a.

b.

c.

d.

APPENDIX F

COPY OF CONSENT LETTER FROM HUMAN SUBJECTS COMMITTEE



THE UNIVERSITY OF ARIZONA
TUCSON, ARIZONA 85724
HUMAN SUBJECTS COMMITTEE
ARIZONA HEALTH SCIENCES CENTER 2305

85

1 October 1980

Veronica A. Giron, R.N., B.S.N.
1717 East Speedway Boulevard
Apartment C-310
Tucson, Arizona. 85719

Dear Ms. Giron:

We are in receipt of your project, "Compliant Behavior Among Individuals with Infectious Tuberculosis", which was submitted to the Human Subjects Committee for review. We concur with the opinion of your College Review Committee that this is a minimal risk project. Therefore, approval is granted effective 30 September 1980.

Approval is granted with the understanding that no changes will be made in either the procedures followed or in the questionnaire used (copies of which we have on file) without the knowledge and approval of the Human Subjects Committee and the College Review Committee. Any physical or psychological harm to any subject must also be reported to each committee.

Sincerely yours,

Milan Novak, M.D., Ph.D.
Chairman

MN/jm

cc: Ada Sue Hinshaw, R.N., Ph.D.
College Review Committee

APPENDIX G
SUBSCALES BY ITEMS AND SENTIMENT

SUBSCALES BY ITEMS AND SENTIMENT

Subscales	Statement Number	Statement Sentiment
Perceived Susceptibility	17	Negative
	22	Positive
	29	Positive
	30	Positive
	35	Positive
	36	Positive
Perceived Severity	15	Positive
	16	Negative
	25	Negative
	28	Positive
	31	Positive
	32	Positive
	33	Positive
37	Positive	
Perceived Barrier (Benefits = 19, 20 both positive sentiment	1	Positive
	2	Positive
	3	Positive
	4	Negative
	6	Negative
	7	Positive
	8	Negative
	9	Positive
	10	Negative
	11	Negative
	Knowledge	13
14		Negative
21		Negative
24		Positive
26		Negative
27		Negative

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