THE EFFECTIVENESS OF A CHOLESTEROL REDUCTION INTERVENTION PROGRAM AMONG FEMALE EMPLOYEES IN A CORPORATE SETTING

THESIS

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By

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Three cholesterol interventions were evaluated in a work-site setting to determine which was most effective in modifying physiological, behavioral, and knowledge measures related to total serum cholesterol. Of the 246 employees initially screened, 135 (55%) were identified as having elevated total serum cholesterol levels (>200 mg/dl) and were eligible for the study. Treatment consisted of either a six-session cholesterol reduction course requiring 30 days dietary monitoring, a six-session course without dietary monitoring, or an incentive only approach.

Significant increases in cholesterol knowledge and dietary fiber consumption was found in both the education intervention with logging and intervention without logging groups. The results indicate that positive learning effects can take place in work-site settings and that such learning can lead to dietary changes that reduce the effects of high serum cholesterol.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Recent studies of human populations find many factors contributing to our nation's number one killer, coronary heart disease. Susceptibility to heart disease is found to consist of several modifiable risk factors, including high serum cholesterol. Results from genetic, experimental, pathologic, epidemiologic, and clinical investigations over the past 25 years have found an independent relationship between high serum cholesterol levels and coronary heart disease (CHD). A variety of research and clinical studies have also recognized the relationship between a high fat diet and high serum cholesterol levels. Families, medical personnel, corporations, and the health care industry have all felt the burden created by elevated cholesterol levels and subsequent disease. It is estimated that this independent risk factor affects 50% of the population beyond the age of 20 (NIH, 1981).

Research from the Lipid Research Clinics Coronary Primary Prevention Trial, released in 1984, suggests that each one percent reduction in cholesterol resulted in a two percent decline in the incidence of cardiovascular mortality (JAMA, 1984). Upon completion of the trial, dietary and

exercise modifications were recognized as reducing serum cholesterol levels. Additional research has also recognized the association between dietary cholesterol and serum cholesterol levels. A 1988 study estimated that increasing dietary cholesterol 100 mg/1,000 kcal could increase plasma cholesterol by 10 mg/dl (Grundy, Barret, Rudel, Miettinen, and Spector, 1988). The importance of lowering dietary and serum cholesterol levels and decreasing the devastating effects of this progressive disease are noted by health professionals in corporate, community, and clinical settings.

In an attempt to reduce the incidence of heart disease, the National Heart, Lung and Blood Institute has launched a National Cholesterol Education Program (NCEP). Community goals and objectives of the NCEP include raising knowledge and awareness levels with respect to blood cholesterol and cardiovascular risk factors, and an increase in work-site activities to reduce elevated blood cholesterol (NIH, 1987). National objectives aimed at increasing work-site activities and the publication of best selling books such as Controlling Cholesterol: A Preventive Program (Cooper, 1988), Eater's Choice: A Food Lovers Guide to Lower Cholesterol (Goor & Goor, 1987), The 8 Week Cholesterol Cure (Kowalski, 1989), and the American Medical Association's (AMA) Count Out Cholesterol written by television

spokesperson Dr. Art Ulene have all raised public awareness regarding the deleterious effects of hyperlipidemia (Ulene, 1989).

Recently, self-help pamphlets, books, and videos have been published and marketed to help individuals decrease serum cholesterol levels. Although self-help methods using goal setting and self-monitoring have been shown to influence dietary adherence (Mahoney, 1974), they have yet to be evaluated in regard to a cholesterol reduction program in a corporate setting.

Today, there is growing popularity with the implementation of health promotion programs in work-site settings (Fielding & Piserchia, 1989). Success of programs have been documented by New York Telephone, The National Aeronautics and Space Administration, Kimberly-Clark, and General Motors (Fox, Goldbeck, and Spies, 1987). Although expanding, there are few evaluations of cholesterol reduction programs corporate work-site settings. A program geared for the corporate setting would be beneficial for those high risk individuals who lack the motivation and knowledge required to achieve blood cholesterol changes.

Statement Of The Problem

To determine if a six-session educational intervention program including dietary logs is most effective in reducing serum cholesterol levels in a sampling of health insurance

employees when compared to a six-session educational intervention program without dietary logs or an incentive only approach.

Purposes Of The Study

1. To determine which of three intervention programs (a six-session course including a diet logging procedure, a six-session course not including a diet logging procedure, or incentive only approach) is more effective in positively modifying physiological, behavioral, and knowledge measures related to high serum cholesterol in a work-site setting.

2. To determine if completing the AMA's 30 day diary for saturated fats, soluble fiber, and cholesterol is effective in reducing the serum cholesterol levels of employees in a work-site program.

3. To assess if there is a relationship between specific demographic characteristics and cholesterol reduction in a work-site setting.

Hypotheses Of The Study

The following two null hypotheses will be considered in this study:

1. There will be no significant modification in physiological, behavioral, and knowledge levels related to high serum cholesterol from pre to post-assessment in subjects exposed to either a six-session education intervention program requiring diet logs to be turned in, a

six-session education interventional program without diet logs, or no educational intervention program but offering an incentive only.

2. A six-week cholesterol reduction educational intervention program incorporating 30 days of diet logs will not have a significantly greater modification in physiological, behavioral, or knowledge dependent measures when compared to an intervention group not requiring weekly dietary logs, an incentive only or control groups.

Research Questions

1. What effect will particular demographic characteristics such as age, race, sex, and education levels have on employees' ability to reduce serum cholesterol?

2. Will employees' knowledge, behavior, and physiological measures related to serum and dietary cholesterol improve by attending a six-session intervention course?

3. Will a six-session intervention course with the addition of dietary logging have more of an effect on behavioral, physiological, and knowledge variables related to diet and cholesterol than a six-session intervention only?

4. What effect will an incentive approach have on an individual's motivation to reduce their dietary cholesterol intake?

The Significance Of The Study

The significant role that individuals play in maintaining their health has received increasing emphasis, thus generating great interest in the health care field (Kronenfeld, Jackson, Davis, & Blair, 1988). Spurring the preventative movement is a large base of scientific literature delineating the relationship between health habits and health status (Berry, 1963; Breslow & Enstrom, 1980; Haggerty, 1977; Langlie, 1977; Paffenbarger, Wing & Hyde, 1978; Rose, Heller, Pedoe & Christie, 1980; Stephens, 1986; Ulene, 1989). Coupling the findings of scientific study with a strong desire by employees for growth in work-site health promotion programs, (Haskell & Blair, 1980; Iverson, Fielding & Crow, 1985; Pate & Blair, 1983) corporate environments are in an excellent position to educate individuals regarding risk factor reduction.

The Blue Cross and Blue Shield of Texas, Inc. wellness program (Healthworks) began in 1984. By 1986, health screenings for blood cholesterol and intervention classes in stress management, nutrition awareness, and smoking cessation had been added.

The need for specifically increasing corporate knowledge regarding elevated cholesterol was discovered after identifying numerous at-risk employees. Past screening records of over 1,500 employees indicated greater

than 50% were above the desirable cholesterol ranges as outlined by the National Cholesterol Education Program.

Initially, serum tests were returned to employees with an explanation sheet attached briefly describing each blood component analyzed. In 1987, blood results were returned with explanation sheets and an invitation to a "Healthy Heart Series". The series was available on company time for those individuals with elevated cholesterol, triglycerides, glucose, or total cholesterol/high density lipoprotein (TC/HDL) ratios. The program included films and lectures on stress management, exercise, proper nutrition, and cholesterol control. Goals of the blood screening and Healthy Heart Series included identification of high risk individuals, increasing awareness of stress, exercise, nutrition, and cholesterol, and referral of high risk individuals to appropriate nutrition courses or personal physicians.

Currently, there is a lack of research on evaluating cholesterol reduction programs in corporate settings. The need to implement such programs is evident from the National Health and Nutrition Examination Survey which estimates that over 60 million Americans are candidates for cholesterol intervention (Sempor, Filwood, Haines, Carroll, Arda, & Cleeman, 1989). This study will focus on employees involved in three separate intervention approaches. The results will

evaluate if a thirty day logging procedure in addition to a six-session educational intervention program is more effective in reducing physiological, behavioral, and knowledge variables related to cholesterol when compared to a six-session education intervention program without dietary monitoring, or no educational intervention program but offering an incentive.

Assumptions

1. The respondents interpret and understand the questionnaires used in the study.

2. The employees reported honestly on self-reported data.

3. There was no cross-contamination of intervention effects by sharing of information among separate treatment group subjects.

Definition Of Terms

American Medical Association (AMA) Guidelines

Dietary guidelines for consumption of saturated fat, soluble fiber, and cholesterol as outlined in the 1989 AMA book Count Out Cholesterol (Ulene, 1989).

National Cholesterol Education Program (NCEP)

A national education program developed and implemented by the National Heart, Lung and Blood Institute (NHLBI) in November 1985 to reduce illness and death from coronary heart disease in the United States by reducing the number of

Americans with high blood cholesterol.

"At-Risk" Employees

Those individuals with total cholesterol readings above 200 mg/dl.

Risk Factors

Characteristics found in apparently healthy persons that influence the subsequent development of diseases. The presence of risk factors does not guarantee that an individual has or will develop the disease, just as the absence of risk factors does not guarantee that the person will not develop the disease. The presence of these factors increases the potential "risk" of developing a specific condition, realizing that there are individual differences.

Exercise

Activity level as assessed by NASA/Johnson Space Center physical activity questionnaire.

Smoking History

As determined by four items on questionnaire to assess level of cigarette smoking.

Family History

Members of immediate family exhibiting any of five cardiovascular conditions as assessed on questionnaire.

Medications

Current medications being taken by participants as assessed by questionnaire.

Systolic Blood Pressure

Pressure exerted against the walls of arteries when the heart contracts, determined by an aneroid sphygmomanometer and a stethoscope on the left arm while in a seated position.

Diastolic Blood Pressure

Pressure exerted against the walls of arteries when the heart relaxes between contractions, assessed by an aneroid sphygmomanometer and a stethoscope on the left arm while in a seated position.

Weight

Determined to the nearest half pound by a floor model scale (shoes and jacket removed).

Incentive

Motivational technique used to enhance a behavioral change and reduce serum cholesterol. Consisted of two round trip tickets to San Antonio.

Cholesterol

Fat-like substance in the bloodstream as determined by Allied Clinical Labs (measured in mg/dl).

High Density Lipoprotein (HDL)

Combination protein and lipid molecule thought to reduce cholesterol build-up in arterial walls, measured in mg/dl.

Low Density Lipoprotein (LDL)

Combination protein and lipid molecule thought to promote the deposit of cholesterol on artery walls, measured in mg/dl.

TC/HDL Ratio

The ratio of total to HDL cholesterol, thought to be an important factor in predicting the risk of heart disease.

Triglycerides

Blood fats which may be a contributing factor in premature heart disease if elevated.

Nutritional Profile

A nutritional recall questionnaire used to evaluate individuals dietary patterns in a typical week, assessed by the NutraSweet Dietary Profile.

CHAPTER II

REVIEW OF LITERATURE

The term cholesterol is familiar to most individuals. Almost daily we hear the phrase on TV and radio or see it mentioned in magazines, newspapers or books. Today, cholesterol is recognized as one of the principle modifiable risk factors for coronary heart disease (CHD), the leading cause of death in the United States (Public Health Service, 1988). According to the American Heart Association (AHA), about 1.5 million heart attacks and over 520,000 deaths from ischemic heart disease occur each year in the United States (AHA, 1989). Although long-term studies designed to determine the cause of these alarming statistics are relatively new, cholesterol has been a basic component of human physiology since the beginning of mankind. In order to understand the health and medical communities current position on cholesterol, it becomes relevant to look at the past history of this silent killer.

Early History Of Cholesterol

In his book Controlling Cholesterol, Dr. Kenneth H. Cooper cites cholesterol's discovery with its extraction from gallstones by French chemist Poulletier de la Salle in 1769 (Cooper, 1988). Research continued through the next

several decades, and eventually the unnamed powdery white substance found by de la Salle was identified in human and animal bile. It was then given the name "cholesterine" from the Greek chole, meaning "bile", and stereos, meaning "solid". Early investigation went on to identify alcohol like molecules in cholesterine, therefore accounting for the name of the organic chemical as we know it today, "cholesterol".

As evident from the data in Table 1, as early as 1900 heart disease was one of the top five leading causes of death.

Table 1

Ten Leading Causes of Death in the United States in 1900

Rank	Cause of Death	Percent Mortality
1	Pneumonia and influenza	11.8
2	Tuberculosis	11.3
3	Diarrhea and enteritis	8.3
4	Heart disease	8.0
5	Cerebrovascular disease	6.2
6	Nephritis	5.2
7	Accidents	4.2
8	Cancer	3.7
9	Diphtheria	2.3
10	Meningitis	2.0

Note. From "The Age Process: Lessons From Observations in Man" by A. Leif, 1988, Nutrition Review, 46, pp. 40-44.

Although not yet the top killer, research on hardening of the arteries and cholesterol had begun. In 1904, the name "atherosclerosis" was first used to describe the penetration of fats into arterial walls. Later the same decade, German scientist Adolf Windaus began to examine the chemical structure of this fascinating substance. Windaus and others eventually discovered that cholesterol levels were elevated in heart tissue that had been damaged by plaque buildup (Windhaus, 1967). At this point, the connection between serum cholesterol and coronary artery disease had not been made. However, Nikola Anitschkow, a Russian scientist, was soon able to establish a relationship between cholesterol-laden foods and hardening of the arteries through his dietary research with rabbits (Anitschkow, 1967).

Cholesterol's Relation To Coronary Artery Disease

Several clinical and epidemiological studies have been performed establishing the relationship between serum cholesterol and CAD. Doctors Major William F. Enos and Lieutenant Colonel Robert H. Holmes autopsied 2000 United States Korean War soldier casualties over a 3-year period (average age of 22 years) and noticed signs of CAD. Thirty-five percent of the casualties had streaky yellow deposits and another 42% had even worse plaque buildup (Moore, 1989).

With 77% of the Korean War casualties showing evidence of CAD, interest in heart disease was at an all time high. The medical community soon sought answers concerning who was at risk and also began to realize that the connection between cholesterol and heart disease would require long-term epidemiological studies on thousands of individuals.

The National Research Council - National Academy of Sciences recently released a comprehensive report providing a large body of evidence from epidemiological studies and experiments in animals to demonstrate the relationship between cholesterol and heart disease (National Research Council, 1989). Included in the councils report was the medical communities three most commonly cited studies. The first study was a long-term prospective investigation of people in Framingham, Massachusetts. The Framingham study began in 1948 to determine characteristics for the development of CAD. In 1971, investigators reported a positive correlation between blood cholesterol levels and heart disease rates across the entire span of cholesterol measurements (Dawber, 1980; see Figure 1).

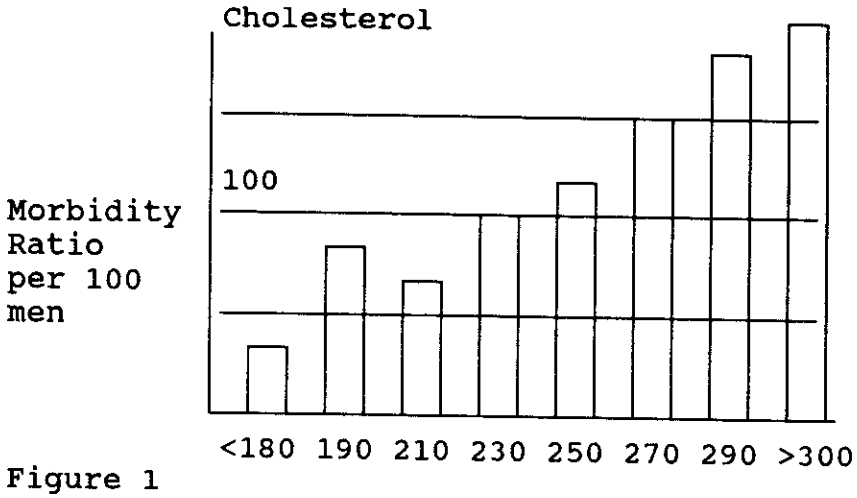


Figure 1

Relationship Between Incidence of CAD and Serum Lipid Concentration.

The data also suggested that low levels of cholesterol were associated with low rates of heart disease, while high cholesterol levels were associated with high rates of heart disease (Kannel, Castelli, Gordon & McNamara, 1971; see Figure 2). The results helped to establish high blood pressure, cigarette smoking, and elevated serum cholesterol levels as predictors or "risk factors" for coronary heart disease (Ernst & Levy, 1980).

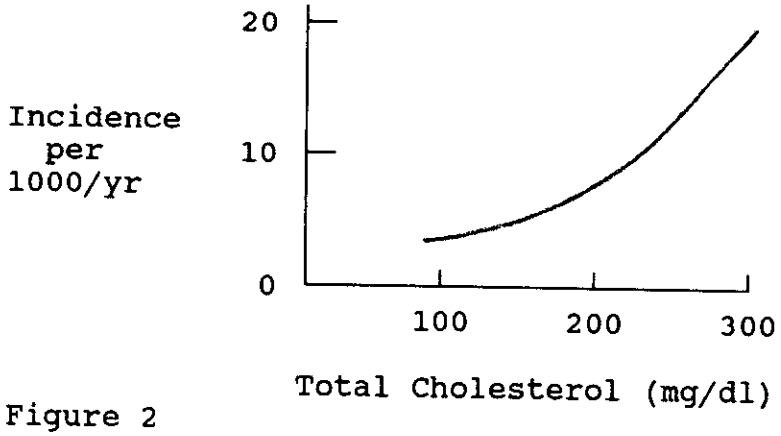


Figure 2

Relationship Between Total Cholesterol and Incidence of Coronary Heart Disease

A second major investigation was the Multiple Risk Factor Intervention Trial (MRFIT). Beginning in 1972, and costing 115 million dollars, the intervention was designed to test the effects of modifying coronary risk factors among a sample of high-risk males. Participants in both the control and treatment groups were followed for a seven year period. The epidemiologic data showed an association between elevated cholesterol and increased heart disease mortality that began with cholesterol levels as low as 180 mg/dl, and that increased steadily, particularly above levels of 200 mg/dl (JAMA, 1982; see Figure 3).

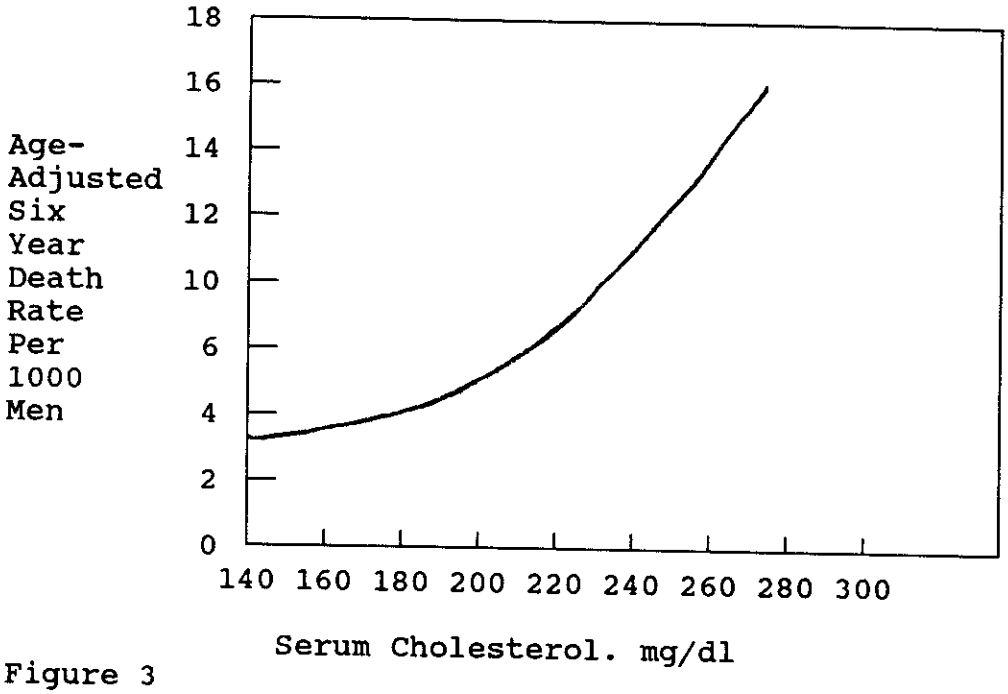


Figure 3

Relationship Between Serum Cholesterol & Death Rate

The third study cited by the medical community was the Lipid Research Centers Coronary Primary Prevention Trial (LRC-CPPT). The study was designed by the Lipid Metabolism Atherogenesis Branch of the National Heart, Lung, and Blood Institute to determine whether lowering cholesterol levels prevents or reduces the risk of CHD. The trial, which lasted 12 years, cost 150 million dollars, involved 12 participating clinical centers and included over 3,800 middle aged men. The double-blind, placebo-controlled study found a 19% reduction in both fatal and non-fatal heart attacks among those being treated with cholestyramine, a cholesterol lowering drug. The trial also indicated that for every 1% decrease in serum cholesterol there was a 2%

reduction in the incidence of CHD (JAMA, 1984).

The Relationship Of Diet And Exercise To Cholesterol

A variety of research has also focused on the influence that dietary factors play in the development of hyperlipidemia. Early observations led scientists to perform experiments producing atherosclerosis in animals by feeding them a diet high in fat and cholesterol (Anitschkow, 1967). It is because of these early animal experiments that current studies have been undertaken to determine the effect of diet on human serum cholesterol levels.

Large population studies have continuously shown a strong relationship between dietary patterns and cholesterol levels. The Seven Countries Study involved men in the United States, Japan, and countries in northern and southern Europe. Evaluating both dietary consumptions and energy expenditure, the results indicated a high correlation between percent of calories as saturated fat and subsequent serum cholesterol levels (Keys, 1970). These results were similar to the Western Electric Study which examined 1900 middle-aged men over a 20 year period. The study identified a positive association between diet and serum cholesterol concentrations (Shekelle, 1981).

In 1979 Levy reviewed over 75 years of literature and concluded that dietary saturated fat and cholesterol raise both total blood cholesterol and low density lipoprotein

levels while dietary polyunsaturated fat lowers total blood cholesterol and LDL cholesterol levels (Levy, 1979). Studies involving small groups have reinforced Levy's findings and have also concluded that monounsaturated fat appears to lower blood cholesterol levels (Grundy, 1986).

Although the difficulty of controlling certain variables are known to exist in nutritional studies, it is unequivocally accepted that diet does directly affect serum cholesterol levels. In 1982, the AHA's Nutrition Committee released a Diet-Heart policy statement. In their statement, experts once again established that dietary saturated fats and cholesterol directly raise plasma total and LDL cholesterol (AHA, 1982). Public health reports estimate that at least 80% of the U.S. population eats a diet sufficiently high in saturated fats to increase the risk of developing heart disease (Havas, 1986). The inescapable relationship between diet and serum cholesterol levels combined with public health reports, has led the AHA and the National Heart, Lung, and Blood Institute (NHLBI) to publish a joint statement regarding the latest information on cholesterol. In their 1989 statement, the committee concluded that the simplest form of cholesterol intervention is a low-fat, low cholesterol diet (AHA & NHLBI, 1989).

Exercise is another factor that has been shown to effect serum cholesterol, specifically HDL levels. Research has

reviewed both the protective affects of HDL and the impact of exercise on HDL levels. Regarding its protective effect, studies have found that the risk of CAD is inversely related to serum levels of HDL. Low levels appear to be associated with increased CAD and high levels appear to be protective (Gordon, 1977).

Although the association between exercise and HDL cholesterol is complicated, current research does allow generalizations to be made. In a study at the Institute for Aerobics Research involving 732 middle aged men, a direct correlation was found between aerobic fitness levels and HDL cholesterol levels (Cooper, 1988, p 225; see Table 2).

Table 2

Association Between Exercise and HDL

Level of Fitness	HDL
Very poor	37.0
Poor	40.0
Fair	41.5
Good	44.5
Excellent	49.3

In 1980 investigators reported high serum HDL levels in marathon runners in comparison with non-runners of similar age (Hartung, 1980). Blair also evaluated runners and non-runners while accounting for dietary differences. Results of his study suggested that high serum HDL levels in runners

compared to the low levels of HDL in the non-runners were not likely to be due to diet (Blair, 1981).

Focusing on exercise as the mechanism responsible for increasing HDL levels, Williams was able to suggest a dose-response effect for running. His research indicated that miles run were positively correlated with increases in HDL levels. Conclusions suggested that a 10 mile/week threshold was required to elicit significant HDL changes (Williams, 1982).

Work-site Health Promotion Programs

The pursuit of good health habits is not a new idea. For generations the health care field has suggested eating a balanced diet, not smoking, getting enough sleep, and exercising on a regular basis. Although individuals have been exposed to the importance of good health, only recently has the American work-site become actively involved. Surveys performed between 1978 and 1986 have shown steady growth in popularity with work-site health promotion programs (Fielding, 1989). While initial programs focused on physical fitness and were often limited to upper management personnel, current programs encompass a wide variety of health topics open to all ranges of workers (Haskell, 1980).

Although the type of activities vary from site to site, surveys have generally identified the following common

activities in work-site programs: hypertension control, smoking cessation, weight control, nutrition, exercise/fitness, stress management, and sometimes accident prevention, cancer risk reduction, mental health counseling, drug abuse education, and Cardiopulmonary Resuscitation (Fielding, 1989). Other studies of work-site programs have identified similar offerings and have indicated that the number of activities tend to increase with work-site size (Kronfield, 1988).

In January of 1989, the American Journal of Public Health published the results of the first nationwide survey of work-site health promotion activities. Of the 1,358 completed interviews, 65.5% of the work-sites with fifty or more employees had one or more areas of health-related programs. The survey indicated that 29.5% provided health risk assessments, 35.6% smoking cessation, 16.5% blood pressure control and treatment, 22.1% exercise/fitness, 14.7% weight control, 16.8% nutrition education, 26.6% stress management, 28.5% back problem prevention, and 19.8% off-the-job accident prevention (Fielding, 1989).

The reasons why work-sites participate in health promotion programs are varied, but program activities tend to be consistent. Most programs target awareness and identification of major risk factors. However, little information is available on organizations that provide

cholesterol reduction programs. In one of the few evaluative work-site efforts, New York Telephone Company's corporate medical department provided its employees with a nonpharmacologic behavioral education program for cholesterol reduction in 1983. The study involved eight one-hour treatment sessions comprised of food behavior change techniques combined with self-management skills, nutrition education, and physical activity planning. The results showed a 6.4% reduction in total serum cholesterol in the treatment groups compared to the control subjects. A significant increase in nutrition knowledge and moderate weight loss was also documented for the treatment groups (Wynder, 1983).

Record Keeping & Self-monitoring

The process of helping people establish and keep good nutritional habits is extremely difficult and complex. Although behavioral science offers a variety of tools with which to approach the problem of modifying eating behavior (American Dietetic Association, 1978), the most important lifestyle behavior technique is record keeping (Brownell, 1980).

Record keeping or self-monitoring is considered to be an important aid in achieving long-term behavior changes. Self-monitoring, as defined by Brown, is "the occurrence of an individual's noticing one's behavior and recording the

observation" (Brown, 1980, p.209). The awareness gained from record keeping has several benefits:

- It can provide information about eating habits and the factors that influence them
- It helps individuals get involved in observing and analyzing dietary habits
- It increases awareness of diet and behavior
- It gives individuals something to review objectively
- It reinforces new behavior, serving as a reminder which allows the individual to make corrections
- It increases the individuals skill in manipulating his/her diet to achieve desired results (AHA, 1983).

Although much of the research on self-monitoring conducted with adults is exclusive of nutrition (Kanfer, 1982), several studies have focused on weight reduction and obesity. The practice of using self-monitoring techniques was successfully documented when Romancyzk noted that self-recording of daily weight and daily caloric intake without therapist contact was as effective as self-recording with weekly therapist contact (Romancyzk, 1974). Self-monitoring has also been found to increase efficacy in behavioral obesity programs. One study involving 16 obesity groups found that after 15 weekly one-hour meetings, the groups that used self-monitoring of eating and activity levels averaged over 6 pounds greater weight loss than the matched

control group (Sperduto, 1986). Bandura & Simon also noted that self-monitoring influenced adherence to dietary intake and discovered that goal setting augmented the self-monitoring process (Bandura and Simon, 1977).

Dietary Guidelines

Initially, nutritional problems in the United States were due to deficiencies. Currently, these problems have been replaced by dietary excess. The Surgeon General's 1988 Report on Nutrition and Health indicated that five of the ten leading causes of death in the United States were associated with dietary excess or imbalances (Surgeon General, 1988; see Table 3).

Table 3

Estimated Total Deaths and Percent of Total Deaths for the 10 Leading Causes of Death: United States, 1987

Rank	Cause of Death	Number	Percent of Total Deaths
1a	Heart diseases	759,400	35.7
	(Coronary heart disease)	(511,700)	(24.1)
	(Other heart disease)	(247,700)	(11.6)
2a	Cancers	476,700	22.4
3a	Strokes	148,700	7.0
4a	Unintentional injuries	92,500	4.4
	(Motor vehicle)	(46,800)	(2.2)
	(All others)	(45,700)	(2.2)
5	Chronic obstructive lung diseases	78,000	3.7
6	Pneumonia and influenza	68,600	3.2
7a	Diabetes mellitus	37,800	1.8
8b	Suicide	29,600	1.4
9b	Chronic liver disease and cirrhosis	26,000	1.2
10a	Atherosclerosis	23,100	1.1
...	All causes	2,125,100	100.0

aCauses of death in which diet plays a part
bCauses of death in which excessive alcohol consumption plays a part.
Source: National Center for Health Statistics 1988.

The need to establish goals for good nutrition in the United States was recognized in the 1930's. As early as 1941, recommendations for meal planning and dietary guidelines had been developed. In 1958, the USDA published "Foods for Fitness - A Daily Food Guide," written to promote the intake of specific nutrients. It was not until the mid-1970's that the focus of national policy objectives began to change from lack of nutrients to excess consumption of nutrients. Concerned with the overconsumption of fat, cholesterol, sugar, salt, and alcohol, a 1977 report "Dietary Goals for the United States" recommended significant changes in average dietary intake patterns (U.S. Senate Select Committee on Nutrition & Human Needs, 1977). The Senate Select Committee's Report on Nutrition and Human Needs provided the following guidelines:

- consumption of complex carbohydrates and naturally occurring sugars (greater than 48% of energy)
- refined and processed sugars (10% of energy)
- total fats (less than 30% of energy)
- saturated fat (less than 10% of energy)
- cholesterol (less than 300 mg/day)
- salt (less than 5 g/day)

The Senate Committee's principles were backed and expanded in 1979 by the Surgeon General's Report on Health Promotion and Disease Prevention and by the 1980 publication

"Nutrition and Your Health: Dietary Guidelines for Americans." In 1985 the Department of Agriculture and the Department of Health and Human Services jointly issued a revised version of the committees' 1977 report (DHHS, 1985). Not surprisingly, Senate guidelines were supported and the following unquantified recommendations were made:

- eat a variety of foods
- maintain desirable weight
- avoid too much fat, saturated fat, and cholesterol
- eat foods with adequate starch and fiber
- avoid too much sugar
- avoid too much sodium
- if you drink alcoholic beverage, do so in moderation

Along with federal guidelines, the AHA also formed committees to provide guidance to the medical community and the American public. In 1957 a group chaired by Dr. Irvine Page researched data on the relationship between diet and heart disease and presented it to the AHA. The data allowed the investigators to conclude: (1) diet may play an important role in the pathogenesis of atherosclerosis; (2) the fat content and total calories of the diet may be the dominant contributing factors; and (3) the type of fat, or the balance between saturated and certain unsaturated fats, also may be important (Page, Stare, Corcoran, Pollack & Wilkinson, 1957).

Currently, the responsibility for updating AHA dietary guidelines rests with the Nutrition Committee. Consisting of scientists in epidemiology, pathology, nutrition, and metabolic disease, these scientists meet two to three time per year to review dietary and CHD data. Since 1968, two dietary statements have been issued by the AHA Nutrition Committee (AHA, 1978). The 1978 general public recommendation suggested:

- no more than 30-35% of calories as fat
- decreases in saturated fats should be replaced by complex carbohydrates and polyunsaturated fats, but intake of polyunsaturates should not exceed 10% of total calories
- cholesterol limited to 300 mg/day
- lowered intake of salt

Completion of the LRC-CPPT, Framingham, and MRFIT studies combined with dietary guidelines from the AHA and the Department of Health and Human Services prompted experts including those at the National Institute of Health, (NIH) to concluded that the last remaining link in the cholesterol controversy had been found (Community Nutrition Institute, 1984). With the last piece of the puzzle in hand, scientists soon launched the nations largest educational campaign, "NCEP". The program's beginning was described in a policy statement of the AHA in 1982 (AHA, 1982). By 1983,

the National Heart, Lung and Blood Institute had conducted surveys among physicians and the public to use as the basis for the campaign. In late 1984 an NIH sponsored conference provided the scientific mandate that the heart institute had sought, and in November 1985 the NCEP was officially launched. Initially, the campaign was taken to the medical community and in 1987 it was released to the public (Moore, 1989).

The 1985 goal of the NCEP was to reduce the prevalence of elevated blood cholesterol in the United States, and thereby contribute to reducing coronary heart disease morbidity and mortality. In order to accomplish its goal, the NCEP developed Health Professional, Public/Patient and Community objectives (Appendix A). Also targeted were four specific program areas: Professional and patient education, public education, work-site programs, and school-based education. To carry out its mission, the NCEP established partnerships with over 20 major health organizations including governmental, professional, voluntary, community, private, industrial, and education groups. Primary objectives for health professionals, including those in corporate settings, were to increase awareness that elevated cholesterol is a cause of CHD, improve knowledge of cholesterol, and increase awareness and understanding of the role diet (reduction of total fat, saturated fat and

cholesterol) plays in reducing elevated blood cholesterol.

In summary, cholesterol has been researched continuously since 1769, therefore demonstrating its importance to science. Though early investigations were not conclusive, current research has enabled the scientific community to establish cholesterol as an independent risk factor for CHD. Furthermore, research has demonstrated an association between the role that diet and exercise play in serum cholesterol levels. Substantial evidence suggests that dietary consumption of saturated fats and cholesterol raise plasma total and LDL cholesterol, while aerobic exercise has been shown to raise protective HDL levels.

Regarding work-site wellness, surveys indicate that program activities are well received by employees and are growing. Research also indicates that programs including self-monitoring are more effective in changing behavior.

CHAPTER III

METHODOLOGY

The purpose of this study was to determine the effectiveness of three intervention programs by measuring changes in behavioral, physiological, and knowledge variables as related to cholesterol reduction in a corporate setting. The intervention programs were targeted for "at-risk" individuals employed at Blue Cross and Blue Shield of Texas, Inc..

A secondary purpose was to assess the effectiveness of the logging system provided in the 1989 American Medical Association's book Count Out Cholesterol (Ulene, 1989).

Selection Of Subjects

All subjects in the study are full-time employees of Blue Cross and Blue Shield of Texas, Inc. located at corporate headquarters in Richardson, Texas. The company currently consists of a work force of 2,384 employees with 79% being female and the remaining 21% being male. The age distribution is as follows: 30-39 years (37%); 20-29 years (29%); 40-49 years (21%); 50-59 years (9%); and 60-70 years (3%).

The sampling frame for the study was composed of 116 Medical, 85 Comptroller, and 200 Claims department employees

(N = 401). These departments represent approximately 15 percent of the company and were selected according to a previously established two year rotation for blood screenings. All individuals were notified of the departmental blood screenings through interoffice memorandums. Two hundred and forty six subjects were screened (response rate 61%). One hundred and thirty five employees initially volunteered to participate in the study and met the eligibility requirements by having serum total cholesterol levels above 200 mg/dl. Although 135 employees were selected, only 63 females (adherence rate 47%) completed both pre and post-assessments. Participation was provided on company time and was completely voluntary. Confidentiality was maintained throughout the study and all data was kept in locked file cabinets by the researcher. Upon entering the subjects data into the computer, names were deleted and numerical values were assigned to each participant.

Instrumentation

The instruments used for data collection in this study were divided into four methods. The first method of collection consisted of blood analysis, blood pressure, and weight measurements. After completing a twelve hour fast, participants' blood specimens were obtained by venipuncture. Lipoprotein analysis was provided by a full service

laboratory, licensed by the State of Texas and certified by the College of American Pathologists. Lipoprotein profiles measured total cholesterol, triglycerides, low density lipoprotein (LDL), high density lipoprotein (HDL), and total cholesterol/HDL ratios.

Blood pressures were measured to the nearest millimeter by an Exactus II aneroid sphygmomanometer and stethoscope. Systolic and diastolic blood pressure was taken in the left arm and determined by phase I and phase V Korotkoff's sounds. Participating employees were seated for five minutes prior to the blood pressure screening. Weight measurements were determined to the nearest half pound (shoes and jacket removed) by a calibrated Health-O-Meter floor model scale.

Self-administered questionnaires comprised the second method for data collection. Five questionnaires were used to determine diet, exercise, knowledge, motivation, and demographic characteristics.

The Nutrition Profile questionnaire (Appendix B) was designed and copyrighted by Wellsource Inc. exclusively for use by the NutraSweet Company. The dietitian involved in the study was a national spokesperson for NutraSweet; therefore, profiles were donated to the cholesterol study. The questionnaire was a self-reported instrument used to evaluate individuals current dietary patterns. To complete

the optically scanned profile, individuals were instructed to recall a typical week and circle on a scale of one to seven the appropriate response to indicate the usual number of servings (per day or week) that were eaten. Participants chose from fruit, milk products, grain products, vegetables, protein rich foods, fat rich foods, mixed dishes/snacks, deserts, and drink groups. The nutritional inventory provided each participant with the following nutritional factors: 1) Total fat (percent of calories), 2) Saturated fat (percent of calories), 3) Cholesterol (mg/day), and 4) Dietary fiber (gms/day).

The second questionnaire was designed and validated by the NASA Johnson Space Center. Participants expressed on a scale from 0-7 their activity level for the previous month. By definition an employee who scored 0 would not participate regularly in programmed recreation, sport, or heavy physical activity. Likewise, and employee who scored 7 would run over 20 miles per week or spend 3 hours per week in comparable physical activity (Appendix C).

The third questionnaire was designed to measure knowledge of cholesterol (Appendix D). The test consisted of six true or false and six multiple choice questions. The 12-item survey was adapted from "The National Cholesterol Test". Test items were developed after extensive research by the executive producer, producer, and writer for American

Broadcasting Communications (ABC) news show "20/20". Before completion, test questions were submitted to ABC's polling staff and also reviewed by medical experts, including Tim Johnson, M.D.

Motivation and demographic item questionnaires were the third method of data collection (Appendix E and F). Designed by the investigator, the demographic questionnaire assessed age, race, gender, and education level.

The motivation questionnaire was developed to examine employees' motivation to reduce cholesterol. After receiving their blood results, participants were asked to circle the number that would indicate the importance of reducing their cholesterol levels and how hard they would be willing to work to achieve a safe level of 200 mg/dl. The two questions were scored on a scale from one through nine, with one representing a low level of importance and nine representing a high level of importance. A third item was added to the questionnaire administered to the "incentive only" group to assess the impact of two free airline tickets to San Antonio on their motivation to reduce cholesterol.

The final method of data collection was developed exclusively for the primary treatment group. During intervention sessions one and two, participants calculated individually recommended ranges for consumption of saturated fat, soluble fiber, and cholesterol based on the AMA's

guidelines. Values were established according to gender, activity level and weight. During the second intervention session, participants were given blank food diaries to be turned in each Friday (Appendix G). They were instructed to calculate their consumption of saturated fat, soluble fiber, and cholesterol each day and to stay within their recommended ranges. Food lists were given to each individual to help calculate their daily consumption.

Procedures

Four hundred and one employees from three departments were notified by interoffice memorandums regarding free departmental blood screenings. Screenings were provided on company time and scheduled in centrally located conference rooms. Trained phlebotomists screened 246 employees on serum cholesterol, triglycerides, HDL, LDL, and TC/HDL ratios. One hundred and thirty five participants had total serum cholesterol levels above 200 mg/dl and were therefore eligible for the study.

Using a table of random numbers, eligible subjects were randomly divided into four groups. Three groups were assigned 34 subjects each and one group was assigned 33. Each group was then randomly assigned to one of four interventions: Group A attended a six session educational intervention program and turned in 30 days of dietary logs; group B attended a six session educational intervention

program covering the same topics as group A, but did not turn in dietary logs; group C was not involved in an educational intervention program, but was offered an incentive (two airline tickets to San Antonio) to lower their total cholesterol by 15%; and group D received neither an intervention nor incentive (control group).

One-week after the initial blood screening, subjects received memos to attend a thirty minute meeting to pick up their blood results (Appendix H). Four group meetings were scheduled, one for each treatment group. During the meetings, pre-intervention questionnaires were administered to each participant assessing demographic information, family medical history, medication history, smoking and exercise habits, dietary patterns, knowledge, and motivation as related to cholesterol reduction. Blood pressure and weight were also measured at the time the questionnaires were given. Before leaving the meeting, subjects were also required to sign the following forms: release of liability, consent to release medical information, and an agreement for involvement in a research study (Appendix I).

A post blood draw was scheduled for all treatment groups upon completion of the six week educational intervention program. Immediately prior to the post blood screening, the same assessments were again administered to the four groups. Appendix J depicts the overall design of

the project.

Interventions

The Healthy Heart program took place at Blue Cross and Blue Shield of Texas, Inc.. The program involved two educational intervention groups (A & B) and one incentive group (C). Group A participated in six intervention sessions which lasted 30 minutes and were held every Friday from 12:00 - 12:30 p.m. for six consecutive weeks. The six sessions were instructor led and consisted of imparting cholesterol-related information through the use of lectures, handouts, slides, overheads, and videos. The sessions were designed to provide knowledge and awareness about the causes of high blood cholesterol, instruction regarding the role that diet and exercise play in reducing elevated cholesterol, and provide the support necessary for behavioral and lifestyle changes. Group A was also required to turn in weekly dietary logs to monitor daily consumption of saturated fat, soluble fiber, and cholesterol (individual levels were set by AMA guidelines). Every Monday and Wednesday the investigator contacted participants by phone to provide encouragement for daily self-monitoring and staying within the pre-established ranges of saturated fat, soluble fiber, and cholesterol consumption.

Group B received the same intervention program as Group A, except that Group B was scheduled to attend sessions

immediately before Group A, and Group B was not required to monitor daily consumption of saturated fat, soluble fiber, and cholesterol, or turn in weekly dietary logs.

Group C was not involved in the educational intervention series or required to turn in weekly dietary logs. However, all of the participants were informed that if they decreased their total serum cholesterol by 15% in six weeks, they would be eligible for a grand prize drawing of two airline tickets to San Antonio.

Two investigators, one trained in exercise physiology and the other a licensed and registered dietitian, provided the six, thirty minute intervention sessions. The information and activities delivered were specifically outlined so that both groups A and B would receive equivalent information.

Session one included a discussion on factors that effect cholesterol, types of cholesterol, recommended level of calories from saturated fat, unsaturated fat and cholesterol, and the relationship between cholesterol and CHD. Handouts that supplemented the lecture were given to each participant (NCEP, 1987; AHA, 1988).

Session two covered the topics of soluble fiber and exercise prescription. The American Medical Association guidelines for establishing ideal ranges of saturated fat, soluble fiber, and cholesterol were also calculated.

Participants received two food lists, a wallet-sized card listing their ideal level of saturated fat, soluble fiber and cholesterol, and a handout on fiber. Group A also received thirty blank dietary records (Ulene, 1989).

In the third session, the dietitian discussed tips for dining out. Tips included how to select lean meats, avoid fried, breaded or casserole types entrees, and how to minimize egg and cheese consumption. Participants were also required to analyze food labels and calculate grams of fat and the percent of fat per serving. Handouts included guidelines for eating, cooking, shopping, and dining out (Environmental Nutrition, 1989).

A thirty minute video ("Freedom From Cholesterol, How to motivate yourself to lower cholesterol"), that dealt with the ways cholesterol effects your body and what you have to do to control it, was shown in session four (Sybervision Systems, 1989).

Session five consisted of a lecture incorporating a meal preparation demonstration. Recipe modification techniques and methods to incorporate oat bran into recipes were discussed. A quick meal preparation including turkey meats and low fat tortilla chips was demonstrated. Handouts consisted of recipes from the American Diabetes Association's Holiday Cookbook (Wedman, 1988) and the "American Heart Association's Recipes for Low-Fat, Low-

Cholesterol Meals" (AHA, 1987).

The sixth and final session summarized the key points presented in the previous five sessions. A humorous stress reduction video was viewed and the class participated as a group in a 12 item fat IQ test (Executive Fitness, 1989).

Data Analysis

The statistical design of the research project was a 4 X 2 analysis of variance (ANOVA) employed to assess significant changes ($p<.05$) in physiological, behavioral, and knowledge variables pre to post-intervention among the three treatment and one control group. The ANOVA procedure assessed the group, trials, and intervention effects. Differences in demographic factors were controlled by random selection and random assignment to treatment groups. The independent variable of the study was the six session intervention course. Dependent variables were classified as physiological, behavioral, and knowledge measures. Listed below are the dependent variables:

Physiological

Total Cholesterol (mg/dl)

Triglycerides (mg/dl)

High Density Lipoproteins (mg/dl)

Low Density Lipoproteins(mg/dl)

TC/HDL Ratio

Systolic Blood Pressure (mmHg)

Diastolic Blood Pressure (mmHg)

Weight (lbs)

Behavioral

Exercise

Total fat intake (percentage of calories/day)

Saturated fat intake (percentage of calories/day)

Dietary Cholesterol intake (milligrams/day)

Fiber intake (grams/day)

Knowledge

Knowledge of cholesterol (correct answers)

CHAPTER IV

RESULTS OF STUDY

The purpose of this study was to determine the effectiveness of three intervention programs by measuring changes in behavioral, physiological, and knowledge variables as related to cholesterol reduction. Two groups were exposed to a six session cholesterol educational intervention while a third group was offered an incentive of two air-line tickets to San Antonio.

Three departments (N=401) making up approximately 15 percent of the company were eligible for involvement in the blood screening analysis. Two hundred and forty six employees (60%) volunteered to participate in the initial blood screening. Nearly 55% of those screened ($\underline{n}$ = 135) had elevated total serum cholesterol levels above the NCEP's recognized desirable level of 200 mg/dl and were therefore involved in the study.

The following demographic information represents the sixty three female employees who participated in both the pre and post-assessments. This information will be followed by medication history data for the groups. The results of the ANOVA comparisons between and within the groups pre to post-assessment on the physiological, behavioral, and

knowledge measures is also provided. Lastly, results representing the dietary logging procedure and the motivation questionnaire will be reviewed.

Background Of Subjects

All participants involved in the study were women. Nearly 76% of all participants were Caucasian, while 16% were Black, 5% Asian, and 3% Hispanic. Educational levels varied, with 35% receiving some college, 27% having earned a high school degree only, 22% were college graduates, 13% held a post-graduate or professional degree, and the remaining 3% were business school graduates (see Table 4). There was no difference in age among the four groups who attended the pre and post-assessments. Ages 30 - 39 had the greatest frequency in each of the four groups.

The age, race, sex, and education demographics of those involved in the study corresponded favorably with the corporate office demographics of Blue Cross and Blue Shield, Inc.. In the corporate office, the percent of females is slightly less (74%), and the largest age group consists of those 30-39 years old (37%). Sixty-eight percent of employees are Caucasian, 23% Black, 6% Hispanic, and 2% Asian. Education levels are also comparable in that 48% are high school graduates, 27% have some college hours, 14.5% are college graduates and 3.8% are business school graduates.

Table 4

Sociodemographic Information of BC/BC Participants (N = 63)

Sex	100% female	
Age		Years
	11% (n = 7)	20-29
	33% (n = 21)	30-39
	27% (n = 17)	40-49
	21% (n = 13)	50-59
	8% (n = 5)	60 and older
Race	76% (n = 48)	White
	16% (n = 10)	Black
	5% (n = 3)	Asian
	3% (n = 2)	Hispanic
Education	35% (n = 22)	Some College
	27% (n = 17)	High School Graduate
	22% (n = 14)	College graduate
	13% (n = 8)	Postgraduate or Professional degree
	3% (n = 2)	Business school graduate

Medication History

Nineteen percent responded they were presently taking hypertension medication, while 13% were taking birth control pills and none were on high cholesterol medication or insulin.

Physiological Variables

Fourteen dependent variables were measured pre and post-intervention. The following table represents the physiological data for experimental groups A, B, C, and control group D (see Table 5). Pre and post-means, standard deviations, and results of the analysis of variance are displayed.

Table 5

Comparisons Within and Between Treatment and Control Groups on Physiological Variables

Cholesterol (mg/dl) (n = 63)

Groups	Pre M	SD	Post M	SD
A	253.33	48.73	238.42	50.10
B	263.23	38.88	233.85	38.24
C	238.40	30.39	224.12	30.85
D	242.15	27.72	229.00	28.53

	df	F	p
Model	7	1.91	.0737
Group	3	1.74	.1635
Pre/Post	1	7.24	.0082
Group * Pre/Post	3	0.31	.8181
Total	125		
Error	118		

(Table 5 continued)

Triglycerides (mg/dl) (n = 63)

Groups	Pre M	SD	Post M	SD
A	95.00	48.56	102.50	48.01
B	161.31	95.05	138.23	71.00
C	133.84	65.52	120.72	69.77
D	165.69	72.22	140.92	43.43

	df	F	p
Model	7	1.85	.0844
Group	3	3.57	.0163
Pre/Post	1	1.32	.2532
Group * Pre/Post	3	0.30	.8220
Total	125		
Error	118		

(Table 5 continued)

LDL (mg/dl) (n = 62)

Groups	Pre M	SD	Post M	SD
A	167.25	40.23	151.67	39.97
B	170.67	28.74	148.00	25.88
C	152.96	31.86	140.36	31.26
D	153.38	28.81	143.08	30.28

	df	F	p
Model	7	1.60	.1426
Group	3	1.42	.2414
Pre/Post	1	6.39	.0128
Group * Pre/Post	3	0.18	.9088
Total	123		
Error	116		

(Table 5 continued)

HDL (mg/dl) (n = 63)

Groups	Pre M	SD	Post M	SD
A	67.17	18.63	66.17	18.90
B	61.46	14.95	58.54	14.41
C	58.64	17.56	59.60	18.78
D	55.54	14.13	57.77	13.44

	df	F	p
Model	7	.76	.6255
Group	3	1.64	.1841
Pre/Post	1	.00	.9873
Group * Pre/Post	3	.12	.9456
Total	125		
Error	118		

(Table 5 continued)

Risk Ratio (Total Cholesterol/HDL) (n = 63)

Groups	Pre M	SD	Post M	SD
A	3.99	1.27	3.79	1.16
B	4.53	1.42	4.19	1.15
C	4.35	1.16	4.06	1.18
D	4.62	1.24	4.15	1.08

	df	F	p
Model	7	.72	.6543
Group	3	.89	.4499
Pre/Post	1	2.22	.1393
Group * Pre/Post	3	.06	.9822
Total	125		
Error	118		

(Table 5 continued)

Weight (lbs) (n = 61)

Groups	Pre M	SD	Post M	SD
A	162.29	27.24	160.46	27.19
B	155.27	42.62	152.19	43.16
C	154.22	29.63	152.83	28.76
D	152.38	29.76	150.77	30.00

	df	F	p
Model	7	.21	.9828
Group	3	.45	.7185
Pre/Post	1	.10	.7483
Group * Pre/Post	3	.00	.9997
Total	121		
Error	114		

(Table 5 continued)

Systolic Blood Pressure (mm/Hg) (n = 63)

Groups	Pre M	SD	Post M	SD
A	129.33	11.52	123.50	14.63
B	133.69	21.90	115.31	15.04
C	127.88	18.48	122.12	17.08
D	126.23	12.91	117.54	14.36

	df	F	p
Model	7	1.89	.0769
Group	3	.34	.7945
Pre/Post	1	9.39	.0027
Group * Pre/Post	3	.94	.4233
Total	125		
Error	118		

(Table 5 continued)

Diastolic Blood Pressure (mm/Hg) (n = 63)

Groups	Pre M	SD	Post M	SD
A	81.83	6.91	80.83	10.43
B	80.46	10.28	77.69	12.30
C	79.68	8.31	78.12	9.85
D	82.77	10.22	76.69	8.52

	df	F	p
Model	7	.66	.7014
Group	3	.38	.7711
Pre/Post	1	2.36	.1268
Group * Pre/Post	3	.36	.7619
Total	125		
Error	118		

The eight physiological variables measured were not found to be statistically significant between the four groups pre to post at the $p>.05$ level. Although not statistically significant, group B (educational intervention/no logging) was found to record the most favorable percent change in cholesterol, LDL, weight, and systolic blood pressure. Across the four groups, positive results occurred in all measures pre to post with the exception of an 8% increase in group A's triglycerides, and a small decrease in group A and B's HDL levels.

Behavioral Variables

Modification in behavioral measures between and within groups pre to post-intervention were also assessed. Table 6 shows the relative changes in level of exercise, milligrams of dietary cholesterol, grams of fiber, and percentage of total fat and saturated fat (see Table 6).

Table 6

Comparisons Within and Between Treatment and Control Groups on Behavioral Variables

Exercise (level of activity) (n = 63)

Groups	Pre M	SD	Post M	SD
A	1.83	1.99	2.42	2.39
B	2.15	1.68	2.39	1.80
C	2.04	1.16	2.08	1.61
D	2.21	1.76	2.21	2.01

	df	F	p
Model	7	.14	.9947
Group	3	.09	.9669
Pre/Post	1	.29	.5913
Group * Pre/Post	3	.15	.9322
Total	125		
Error	118		

(Table 6 continued)

Total Dietary Fat (% of calories) (n = 53)

Groups	Pre M	SD	Post M	SD
A	34.48	3.47	27.99	7.57
B	33.20	8.32	31.31	6.38
C	34.43	7.92	32.32	8.47
D	31.01	5.73	32.53	6.93

	df	F	p
Model	7	1.05	.4032
Group	3	.49	.6910
Pre/Post	1	2.49	.1179
Group * Pre/Post	3	1.13	.3420
Total	105		
Error	98		

(Table 6 continued)

Dietary Saturated Fat (% of calories) (n = 53)

Groups	Pre M	SD	Post M	SD
A	10.64	1.86	7.71	2.59
B	9.81	2.55	9.38	2.98
C	9.90	2.86	9.61	3.40
D	9.34	1.98	9.45	2.07

	df	F	p
Model	7	1.07	.3906
Group	3	.24	.8675
Pre/Post	1	2.23	.1382
Group * Pre/Post	3	1.50	.2185
Total	105		
Error	98		

(Table 6 continued)

Dietary Cholesterol (mg) (n = 53)

Groups	Pre M	SD	Post M	SD
A	180.26	90.36	200.00	144.05
B	163.73	83.00	236.18	208.48
C	162.30	62.82	152.25	67.50
D	215.36	113.13	185.09	77.36

	df	F	p
Model	7	.95	.4731
Group	3	1.15	.3317
Pre/Post	1	.19	.6668
Group * Pre/Post	3	1.00	.3971
Total	105		
Error	98		

(Table 6 continued)

Fiber (grams) (n = 53)

Groups	Pre M	SD	Post M	SD
A	9.71	6.41	17.92	8.63
B	11.79	8.69	15.99	11.46
C	10.35	5.82	10.47	5.47
D	16.38	8.25	10.95	4.40

	df	F	p
Model	7	2.41	.0253
Group	3	1.76	.1608
Pre/Post	1	1.09	.2985
Group * Pre/Post	3	3.51	.0181
Total	105		
Error	98		

Group C (incentive only) responded favorably to all five behavioral variables. Decreases were found in total fat, saturated fat, and cholesterol consumption while increases were made in fiber consumption and exercise habits. Although the five previously mentioned positive changes were made, (See table 6) pre to post-percent changes were small. Groups A and B improved in total fat, saturated fat, fiber consumption and exercise habits, but an unexpected increase was noted in dietary cholesterol intake.

A significant difference was found pre to post-assessment among the four groups on dietary fiber intake $F(3, 98) = 3.51$, $p<.0181$. The figure below represents a plot of the pre/post-fiber intake means for groups A, B, C, and D.

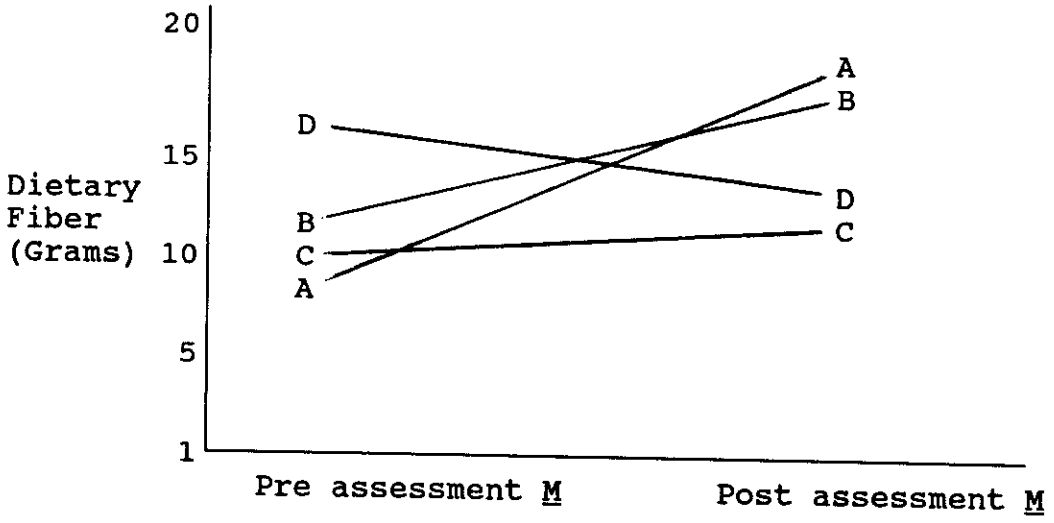


Figure 4

Pre and Post- Dietary Fiber Consumption

As seen from Figure 4, a group by time interaction is evident. Control group D started with the highest fiber consumption and decreased, while group A and B's pre to post-lines intersect with group D. Groups A and B displayed the largest pre to post-difference in fiber consumption with increases of 85% and 35% respectively. Although incentive group C's pre fiber consumption was initially between groups A and B, the minimal .12 grams per day increase allowed for a pre to post-crossover with group A.

Knowledge

Employees were also measured on a 12-item questionnaire to assess general knowledge of cholesterol. Table 7 represents the four groups correct knowledge scores.

Table 7

Knowledge of Cholesterol

Knowledge (0 - 12 answers correct) (n = 59)

Groups	Pre M	SD	Post M	SD
A	7.82	1.47	9.91	.94
B	7.25	1.60	9.25	1.48
C	9.04	1.87	8.43	1.97
D	7.54	2.30	7.46	2.88

	df	F	p
Model	7	3.23	.0037
Group	3	2.84	.0413
Pre/Post	1	2.34	.1290
Group * Pre/Post	3	3.92	.0105
Total	117		
Error	110		

Knowledge scores for intervention groups A and B improved 27% and 28%, while groups C and D experienced a slight decrease. Differences in the mean scores pre to post-between groups was significant $F(3, 110) = 3.92$, $p<.0105$.

Figure 5 illustrates the pre and post-knowledge means for all four groups.

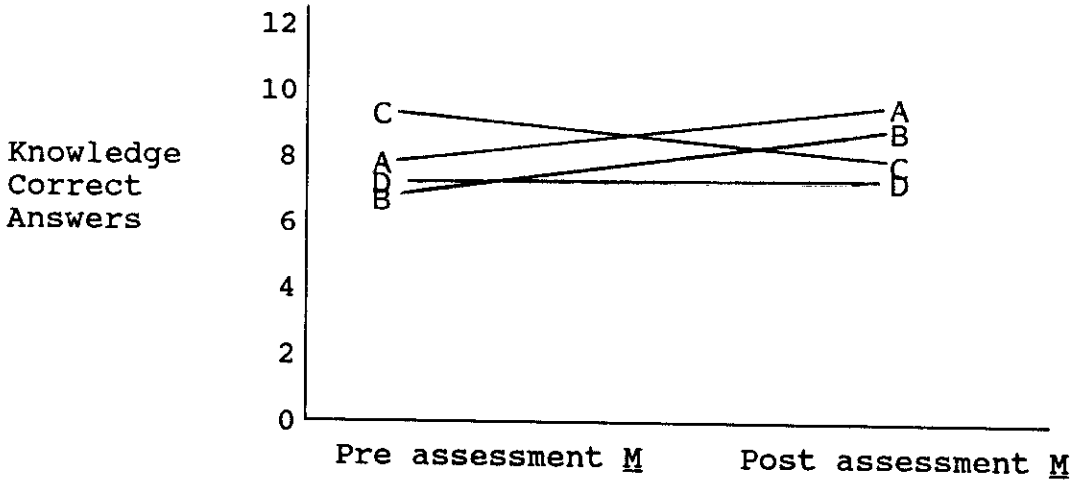


Figure 5

Pre and Post-Cholesterol Knowledge

As observed in figure five, a group by time interaction is again evident. Control group D's cholesterol knowledge remained relatively constant throughout the pre to post-period. Experimental group A (intervention plus logging) and B's (intervention only) pre to post-knowledge levels increased 27% each. Group C (incentive only) decreased knowledge levels by 6.75% therefore, intersecting with groups A and B. Both groups A and B increased an average of two correct responses after attending the six session intervention series.

* a score of twelve represents a perfect score

Motivation Results

Table 8 illustrates the mean motivation scores at the pre-intervention assessment for groups A, B, C, and D. Motivation was scored on a scale of 1 - 9, with one representing a low level of importance and nine representing a high level of importance.

Table 8

Motivation Results

	QUESTIONS						Combined
	1		2		3		1 & 2
Groups	M	SD	M	SD	M	SD	M
A	8.69	.85	7.92	1.44			8.31
B	8.67	.72	8.40	.91			8.53
C	7.94	1.92	7.61	1.64	4.72	2.63	7.77
D	8.10	1.27	7.93	1.08			8.02
Total	8.35		7.97				

Question 1: How important is reducing your present cholesterol level?

Question 2: How hard are your willing to work?

Question 3: How important is the addition of airline tickets? (Group C only)

Overall, group motivation scores indicated it was important to reduce present levels of cholesterol to a safe level of 200 mg/dl (total M = 8.35).

When responding to how hard they were willing to work

to accomplish a cholesterol goal of 200 mg/dl, participants scored somewhat lower (Total M = 7.97). These results suggest that although motivation to reduce cholesterol is high, employees are not as motivated when it comes to the work required to achieve a safer level of cholesterol.

Group C (incentive only) was also asked a third question, to access the importance of two airline tickets toward their motivation to reduce cholesterol. Although indicating it was important to reduce cholesterol (M = 7.94, SD = 1.92) and indicating their willingness to work hard (M = 7.61, SD = 1.64), a mean score of (M = 4.72, SD = 2.63), suggests that the incentive of two airline tickets was not particularly motivating. Five individuals in group C reduced their cholesterol by 15% and were involved in the grand prize drawing.

Dietary Logging Procedure For Group A

Participants in group A (educational intervention plus logging) were responsible for monitoring their daily consumption of saturated fat, soluble fiber, and cholesterol and turning in 30 days of dietary logs. Only those individuals who completed 18 or more days of dietary logs were analyzed. The following data represents the number of days in which group A met their dietary goals as well as their average daily consumption of saturated fat, soluble fiber, and dietary cholesterol (see Table 9).

Group A averaged returning 28 of the 30 dietary logs. However, dietary guidelines for the consumption of saturated fat, soluble fiber, and cholesterol were not successfully attained. In particular, recommended amounts of dietary cholesterol were eaten 63% of the time (19 days) and recommended levels of saturated fat levels were accomplished 23 days (77%). Soluble fiber goals were obtained 18% of the time, therefore accounting for only 5 of the 30 days. Analysis of the dietary logs indicated an acceptable average daily consumption of saturated fats and cholesterol while soluble fiber was found to be well below the suggested guidelines.

Table 9

Dietary Logging For Group A

n = 12

Number of Days Dietary Goals Were Met

Saturated Fat Intake Days Met	Soluble Fiber Intake Days met	Dietary Cholesterol Intake Days Met
M=22.67 SD=7.35	M=5.42 SD=7.79	M=19.17 SD=6.24

Average Daily Consumption

Saturated Fat (gm/day)	Soluble Fiber (gm/day)	Dietary Cholesterol (mg/day)
M=13.40 SD=5.16	M=6.99 SD=3.39	M=142.42 SD=53.47
*(17-36) optimal range	*(10-18) optimal range	*(300 or less) optimal range

* Range established by AMA guidelines

CHAPTER V

DISCUSSION OF RESULTS, CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

The purpose of this study was to determine which of three interventions were most effective in reducing high serum cholesterol levels. A total of 63 female employees in a work site setting participated in the study. Employees were initially divided into four equally sized groups although at completion of the study group sizes varied from 12-25 participants. Statistical evaluation of the data involved physiological, behavioral, and knowledge measures among the four groups.

The following two null hypothesis were stated for this study:

1. There will be no significant modification in physiological, behavioral, or knowledge levels related to high serum cholesterol from pre-to post assessment in subjects exposed to either a six session educational intervention program requiring diet logs to be turned in, a six session educational intervention without diet logs, or no educational intervention but offering an incentive.

2. A six week cholesterol reduction educational intervention requiring weekly diet logs will not have a

significantly greater modification in physiological, behavioral, or knowledge dependent measures when compared to the intervention group not requiring weekly diet logs, the incentive group or the control group.

Discussion Of Results

Even though significant changes in pre to post-knowledge scores were found among the groups, overall non-significant changes in the physiological and behavioral variables did not precipitate rejection of the first null hypothesis at the $p<.05$ level of significance. However, several positive modifications were evident as a result of the interventions. All treatment groups did reduce initial total serum cholesterol levels by a combined average of 20 mg/dl (7.7%), although in no group did the M decrease below the NCEP's recommended 200 mg/dl level. These results are similar to the 5% cholesterol reduction found in the health education campaign that was part of the Stanford three-community study (Stern, Farquhar, Maccoby, & Russell, 1976). Additionally, all groups made positive changes in LDL M = 15 mg/dl (-10.3%); risk ratio M = .33 (-6.4%); systolic blood pressure M = 10 mmHg (-7.6%); and diastolic blood pressure M = 1.8 mmHg (-2.2%).

Although results of the three treatment groups indicated a pre to post-reduction in serum cholesterol levels, similar reductions were made in the control group.

These findings are consistent with the six-year follow-up evaluation of the MRFIT study which also documented cholesterol reductions in the control group (MRFIT, 1982). Decreases in the control group could be attributed to participants knowledge of involvement in the study and/or heightened awareness from the pre-assessment blood results. Participants in intervention group B experienced the largest decrease in serum cholesterol levels ($\underline{M}$ = 29 mg/dl compared to $\underline{M}$ = 13 mg/dl in the control group). Treatment group B also demonstrated the largest decrease in LDL ($\underline{M}$ = 23 mg/dl vs $\underline{M}$ = 10 mg/dl control group); weight ($\underline{M}$ = 3 lbs. vs $\underline{M}$ = 1.6 lbs. control group); and systolic blood pressure ($\underline{M}$ = 18 mmHg vs $\underline{M}$ = 8.7 mmHg control group), yet an unexplained 7.5 mg/dl increase in group A's triglycerides and a slight decrease in group A & B's HDL levels did occur.

Similar to the changes in physiological variables, except for fiber intake, significant modifications in the behavioral measures among groups were not found. An analysis of dietary intake from the recall data indicated no significant pre to post-differences among the four groups consumption of total fat, saturated fat, and cholesterol. Although not statistically significant, treatment groups A (intervention and logging), B (intervention only), and C (incentive only) did decrease their percentage of calories from total fat and saturated fat, while control group D

experienced an increase.

With regards to dietary cholesterol consumption, increases were found in intervention groups A and B. This increase may have been due to the intervention series which emphasized not exceeding 300 milligrams of cholesterol per day. Although the elevated cholesterol intake was unwanted, participants still remained within the 300 mg/day guidelines.

In addition to analyzing total dietary fat, saturated fat, and cholesterol, this study also examined changes in fiber consumption. The pre to post-assessment of dietary fiber was found to be significant between the four groups $F(3, 98) = 3.51$, $p < .0181$. An 84% and 36% increase in fiber intake was discovered for groups A and B, respectively. This would support the conclusion that nutrition education can impact an individual's choices concerning dietary fiber. This finding also has possible ramifications for females in terms of reducing risk for other diseases related to fiber intake. One possible reason for the significant change in these groups dietary fiber intake is that individuals find it pleasurable to increase consumption of food rather than restrict it.

The subjects in the study were also assessed on exercise habits. Only marginal non-significant increases were found among the three intervention groups. Although

research has shown that aerobic exercise is associated with increases in HDL levels, the minimal pre to post-exercise improvements in groups A and B were not accompanied by an increase in HDL levels.

Lastly, pre to post- assessment of changes in cholesterol knowledge scores were statistically significant F (3, 110)=3.92,p<.0105. Again, the greatest increases were seen in those groups receiving the intervention course. On a test where 12 is the maximum score, group A increased pre to post-knowledge (M = 2.09, SD = 1.97) and group B (M = 2.00, SD = 1.35). Groups C and D on the other hand demonstrated a small drop in cholesterol knowledge (Group C = M = -.61, Group D = M = -.08). These results are similar to the 1983 findings of the New York Telephone Companies' cholesterol reduction program. In their study, the authors documented a statistically significant increase in nutritional knowledge for the treatment group while no difference was found in the control group (Wynder, 1983).

The study did not support the thesis that turning in weekly dietary logs would have a more beneficial effect on physiological, behavioral, or knowledge measures when compared to the other groups. Although group A did show statistically significant increases in knowledge and fiber consumption, group B also showed similar results. Therefore, the changes could not be attributed to the

dietary logs and thus the null hypothesis is accepted. The significant changes in fiber and knowledge for both groups A and B would indicate that attending only the educational intervention program may be as effective as attending the intervention program plus diet logging.

Despite findings by Bandura and Simon which indicate that self-monitoring influences dietary adherence (Bandura & Simon, 1977), group A was unable to meet pre-assigned dietary goals. Group A did, however, show more significant dietary changes in saturated fat, soluble fiber, and dietary cholesterol than the other groups. Possibly the logging procedure played a part in these improvements.

Conclusions

1. Cholesterol testing at the work-site appears to be an affective strategy to reducing elevated cholesterol levels as witnessed by pre to post changes in all groups involved in the study.

2. Attending educational intervention can have an impact on selected knowledge and behavioral variables related to high cholesterol.

Limitations

Participants in this study (N=135) were randomly assigned to an intervention group based on an "at risk" characteristic, regardless of interest. This undoubtedly accounted for the low adherence rate (pre N=135, post N=63,

drop out rate 47%). Other adherence limiting factors were also present including:

1. Only three departments participated in the study and all subjects were female. Therefore, the subjects were not a true representation of all employees of Blue Cross and Blue Shield of Texas, Inc.. Since random selection of groups was not conducted, the generalizability of results to the entire population may not be externally valid.

2. The respondents in the incentive-only group may not be uniformly motivated over the offered incentive.

3. The study relied on one pre and post-blood sample within the subjects. To account for the uncertainty and variation in single measurements, it is generally suggested that two or three determinations be obtained (Archives of Internal Medicine, 1988).

4. Data gathered pre and post-intervention regarding smoking, exercise habits, and dietary recall are self-reported which may bias the results of the study.

5. Individual's normal daily dietary patterns may not be adequately measured through a dietary recall.

6. Work-related responsibilities may interfere with participants attending one or more sessions of the intervention series and/or participants attending the post-intervention blood draw.

7. The age and sex distribution of Blue Cross and

Blue Shield employees may not be representative of a "typical" U.S. corporation.

8. All participants had to complete both pre and post-assessments.

9. Groups A and B were required to attend a minimum of five intervention sessions.

10. Group A was required to complete a minimum of 60% of their dietary logs.

11. In a closed corporate environment, sharing of information likely took place.

12. Due to corporate policy, control group participants were required to sign a release from liability and a consent to release medical information. Within the liability waiver, subjects were informed of their participation in a study to evaluate high blood cholesterol programs. This factor may have "sensitized" the control group and motivated them to initiate behavioral changes that ordinarily would not have taken place.

13. There is a discrepancy between the pre and post-assessment which measured total dietary fiber compared to the AMA guidelines which only monitored soluble fiber.

Recommendations

1. Corporate health promotion programs should continue to focus on risk factor education, and in particular, target cholesterol reduction among employees.

2. University and medical schools must continue to provide current and accurate cholesterol information to future health educators.

3. Health professionals must stay abreast of updated behavior modification techniques and current research findings on cholesterol.

4. Additional research on cholesterol reduction should be conducted in the corporate setting, and the long-term benefits of cholesterol education should be evaluated.

5. Research is needed to determine if an optimal time frame for follow-up and retesting of the total serum cholesterol exists that would maintain positive behavioral changes related to serum cholesterol.

6. Although affecting the internal validity of the study, to increase adherence rate only those individuals who volunteer should comprise the intervention plus logging group.

APPENDIX A

NATIONAL CHOLESTEROL EDUCATION OBJECTIVES

NATIONAL
CHOLESTEROL
EDUCATION
PROGRAM

National Cholesterol Education Program
GOALS AND OBJECTIVES

GOAL: To reduce the prevalence of elevated blood cholesterol in the United States, and thereby contribute to reducing coronary heart disease morbidity and mortality.

OBJECTIVES:

Health Professionals

1. To increase awareness among health professionals that elevated blood cholesterol is a cause of coronary heart disease, and that reducing elevated blood cholesterol levels will contribute to the reduction of coronary heart disease risk.
2. To improve the knowledge, attitudes, and skills of health professionals to identify and intervene with patients who have elevated blood cholesterol, and to provide guidelines regarding methods and approaches to use in detection, treatment, and follow-up of patients.
3. To encourage health professionals to consider an individual's blood cholesterol level in relation to his or her other CHD risk factors.
4. To increase the awareness and understanding of health professionals regarding the major role that diet plays in reducing elevated blood cholesterol.
5. To increase the awareness and understanding of health professionals regarding the role of weight control and exercise in the management of high blood cholesterol.
6. To increase the knowledge of health professionals about the appropriate use of cholesterol-lowering drugs.
7. To increase the proportion of health professionals who diagnose and treat patients with high blood cholesterol in accordance with the best existing information (e.g., measuring blood cholesterol levels at appropriate intervals, initiating treatment at appropriate levels of blood cholesterol, and providing adequate counseling support to patients).
8. To promote interdisciplinary collaborative efforts in the management of patients with elevated blood cholesterol. Proper management of this condition will require close cooperation among health professionals including physicians, nurses, dietitians, and pharmacists.
9. To improve the knowledge, attitudes, and skills of students in the health professions regarding high blood cholesterol and its management.
10. To improve precision and accuracy in the measurement of blood cholesterol levels and to promote standardized reporting of laboratory results.

Public/Patient

1. To increase awareness that elevated blood cholesterol is a cause of coronary heart disease, and that reducing elevated blood cholesterol levels will contribute to the reduction of coronary heart disease risk.
2. To increase the proportion of Americans who have reduced their dietary intake of total fat, satuated fat, and cholesterol as part of a nutritionally adequate diet.
3. To increase the proportion of Americans who have their blood cholesterol measured.
4. To increase the proportion of Americans who know their blood cholesterol level.
5. To encourage people identified as having high blood cholesterol to seek professional advice and follow-up.
6. To increase awareness that diet plays a major role in lowering high blood cholesterol, that weight control and exercise also play a role in the management of high blood cholesterol, and that, if necessary, drugs may be added to the regimen.
7. To increase public knowledge about the dietary principles for reducing blood cholesterol levels.
8. To increase the proportion of people with high blood cholesterol who adhere to their cholesterol-lowering regimen.

Community

1. To increase activities for blood cholesterol control at the state and community level.
2. To increase coordination, communication, and collaboration in blood cholesterol control among community, professional, industry, and government organizations.
3. To increase awareness and knowledge among students, especially those in primary and secondary schools, with respect to blood cholesterol and cardiovascular risk factors in general.
4. To increase worksite activities to reduce elevated blood cholesterol levels.
5. To develop program activities and products that are appropriate to the needs of minorities and other special populations, and to actively involve health professionals and organizations that serve these populations.
6. To promote increased dissemination of scientifically accurate cholesterol-related information by the print and electronic media.

APPENDIX B

NUTRITION PROFILE

Printed in U.S.A. NCS Trans-Optic® MP81112-321 A9108

Nutrition Profile

Questionnaire

Name _____

Address _____

City _____ ST _____ Zip _____

Gender ① Male ② Female

Age (yrs)

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

Instructions (use a no. 2 pencil only; make no stray marks)
Think back to last week and indicate the usual number of servings (per day or week) you ate from each food group listed below. If last week was unusual, consider a typical week. Notice the serving sizes and adjust your servings reported accordingly. Be sure to include added sugar, butter, jam, gravy, cooking fats, etc. Skip any food you did not eat.

Example: If you normally drink 1/2 cup (4 oz.) of orange juice each morning, you would fill in circle number 1 under citrus fruits (one serving is listed as 1/2 cup). If you eat a small banana once or twice every week, you would fill in circle number 5 under other fresh/dried fruit.

servings/day				or servings/week				Serving sizes of selected foods
1	2	3	4+	1-2	3-4	5-6		
							Fruits	
1. ●	②	③	④	⑤	⑥	⑦	Citrus, berries, melons	1 orange, 1/2 grapefruit, 1C (cup) strawberries, melon, or 1/2C orange juice
2. ①	②	③	④	●	⑥	⑦	Other fresh/dried fruit	Sm (small) apple, sm banana, lg (large) peach, 2 plums, 1C grapes, 1 oz. raisins or other dried fruit

servings/day				or servings/week				Serving sizes of selected foods
1	2	3	4+	1-2	3-4	5-6		
							Fruits	
1. ①	②	③	④	⑤	⑥	⑦	Citrus, berries, melons	1 orange, 1/2 grapefruit, 1C (cup) strawberries, melon, or 1/2C orange juice
2. ①	②	③	④	⑤	⑥	⑦	Other fresh/dried fruit	Sm (small) apple, sm banana, lg (large) peach, 2 plums, 1C grapes, 1 oz. raisins or other dried fruit
3. ①	②	③	④	⑤	⑥	⑦	Canned fruit	1/2C applesauce, peaches, pears, or fruit cocktail
4. ①	②	③	④	⑤	⑥	⑦	Fruit juice, no added sugar	1C, apple, grape, pineapple, or cranberry
							Milk Products	
5. ①	②	③	④	⑤	⑥	⑦	Non-fat	1C skim milk, nonfat plain yogurt, or buttermilk
6. ①	②	③	④	⑤	⑥	⑦	Low-fat	1C 2% milk, low fat plain yogurt, 1/2C low fat cottage cheese, or 1 oz. skim milk cheeses such as mozzarella
7. ①	②	③	④	⑤	⑥	⑦	Full-fat	1C whole milk or plain yogurt, 1/2C creamed cottage cheese, 1 oz. regular cheese such as American, Swiss, or cheddar
							Grain Products	
8. ①	②	③	④	⑤	⑥	⑦	Whole-grain	2 slices bread, muffin or 3/4C dry cereal, 2/3C cooked cereal including brown rice and whole corn
9. ①	②	③	④	⑤	⑥	⑦	Sugar-sweetened cereal	3/4C corn flakes, puffs, etc.

	servings/day				or	servings/week			
	1	2	3	4+		1-2	3-4	5-6	
10.	①	②	③	④		⑤	⑥	⑦	Other grains
11.	①	②	③	④		⑤	⑥	⑦	Quick breads
Vegetables									
12.	①	②	③	④		⑤	⑥	⑦	Vitamin A rich
13.	①	②	③	④		⑤	⑥	⑦	Starchy vegetables
14.	①	②	③	④		⑤	⑥	⑦	Other vegetables
Protein Rich Foods									
15.	①	②	③	④		⑤	⑥	⑦	Fish and sea foods
16.	①	②	③	④		⑤	⑥	⑦	Low fat meats
17.	①	②	③	④		⑤	⑥	⑦	Medium fat meats
18.	①	②	③	④		⑤	⑥	⑦	High fat meats
19.	①	②	③	④		⑤	⑥	⑦	Legumes
20.	①	②	③	④		⑤	⑥	⑦	Egg
21.	①	②	③	④		⑤	⑥	⑦	Vegetarian entree
Fat Rich Foods									
22.	①	②	③	④		⑤	⑥	⑦	Veg. fats
23.	①	②	③	④		⑤	⑥	⑦	Animal fats
24.	①	②	③	④		⑤	⑥	⑦	Other fats
Mixed Dishes/Snacks									
25.	①	②	③	④		⑤	⑥	⑦	Pasta
26.	①	②	③	④		⑤	⑥	⑦	Hot dishes
27.	①	②	③	④		⑤	⑥	⑦	Ethnic foods
28.	①	②	③	④		⑤	⑥	⑦	Soup
29.	①	②	③	④		⑤	⑥	⑦	Snacks
Desserts									
30.	①	②	③	④		⑤	⑥	⑦	Cream desserts
31.	①	②	③	④		⑤	⑥	⑦	Baked goods
32.	①	②	③	④		⑤	⑥	⑦	Pie
33.	①	②	③	④		⑤	⑥	⑦	Sweets
Drinks									
34.	①	②	③	④		⑤	⑥	⑦	Sugar-sweetened
35.	①	②	③	④		⑤	⑥	⑦	Alcohol

36. ① Yes ② No

Would you like additional information from The NutraSweet Company?

Serving sizes of selected foods

2 slices white bread, 1 roll, hamburger bun, tortilla, or 1 oz. crackers

2 pancakes, muffin, biscuit, sm croissant, 1/2 bagel, sm waffle, or 2" x 2" cornbread

Dark yellow and green vegetables, eg. 2/3C cooked greens, carrots, or 1 spear broccoli

1/2C cooked, winter squash, potato, yams, or green peas

1C fresh or 1/2C cooked, green beans, cabbage, greens, lettuce, tomato, squash, or 1C tomato juice

3 oz. tuna fish, salmon, shrimp, oysters, or white fish

3 oz. skinless poultry, lean wild game, or veal

3 oz. most lean cuts of beef, pork, and lamb, fried chicken, or fried fish

3 oz. prime cuts of beef, sausage, luncheon meats, meat loaf, hamburger, frankfurter, or bacon

1C cooked, pinto beans, white beans, garbanzos, lentils, or split peas

1 lg egg (if fried, add fat below)

3 oz. patty, meat alternatives, or tofu dishes

1T (tablespoon) vegetable oil, margarine, or mayonnaise, or 2T salad dressing

1T butter or lard, 2T cream, cream cheese, sour cream, or 1/4C gravy made with fat

2T of nuts or seeds, 1T peanut butter, 1/4 avocado, or 10 olives

2/3C macaroni and cheese, lasagne, spaghetti with tomato/cheese sauce or 1C pasta salad

1C chili with beans, beef and vegetable stew or pot pie

1 taco, enchilada, slice pizza, or sm burrito

1C chicken noodle, vegetable, or tomato

1 oz. snack crackers, corn chips, potato chips, buttered popcorn, or 1/2 serving french fries

2/3C ice cream, sm milk shake, 1/2C pudding, slice cream pie, sm slice cheese cake, or 1/3C mousse

2 cookies, sweet roll, doughnut, slice cake, or other pastry

1 slice, apple, cherry, or peach pie

6 tsp (teaspoons) sugar, 2T jam, honey, or 1 candy bar

1C punch, or 1 can soda pop

12 oz. beer, 3-4 oz. wine, or 1.5 oz. liquor

APPENDIX C

EXERCISE QUESTIONNAIRE

Healthworks

NAME: _____

EXERCISE: PLEASE CIRCLE ONLY ONE NUMBER (Please Print)

Please circle the appropriate number (0-7) which best describes your general ACTIVITY LEVEL for the PREVIOUS MONTH.

DO NOT participate regularly in programmed recreation, sport or heavy physical activity.

0 - Avoid walking or exertion, e.g., always use elevator, drive whenever possible instead of walking.

1 - Walk for pleasure, routinely use stairs, occasionally exercise sufficiently to cause heavy breathing or perspiration.

Participated regularly in recreation or work requiring modest physical activity, such as golf, horseback riding, calisthenics, gymnastics, table tennis, bowling, weight lifting, yard work.

2 - 10 to 60 minutes per week.

3 - Over one hour per week.

Participate regularly in heavy physical exercise, e.g., running or jogging, swimming, cycling, rowing, skipping rope, running in place, or engaging in vigorous aerobic activity type exercise such as tennis, basketball or handball.

4 - Run less than one mile per week or spend less than 30 minutes per week in comparable physical activity.

5 - Run 1 to 5 miles per week or spend 30 to 60 minutes per week in comparable physical activity.

6 - Run 5 to 10 miles per week or spend 1 to 3 hours per week in comparable physical activity.

7 - Run over 20 miles per week or spend over 3 hours per week in comparable physical activity.

DO NOT COMPLETE THIS SECTION:

Blood pressure _____

Weight _____ Height _____

APPENDIX D

CHOLESTEROL KNOWLEDGE QUESTIONNAIRE

NAME: _____

(PLEASE PRINT)

Healthworks

HEALTHLINE

Blue Cross and Blue Shield of Texas, Inc.

PLEASE CIRCLE THE CORRECT RESPONSE:

1. Doctors recommend you keep your cholesterol level below:

   a. 300
   b. 250
   c. 200
   d. 100

2. Please identify the saturated fat

   a. peanut oil
   b. palm oil
   c. olive oil
   d. corn oil

3. Which dietary fiber is thought to lower cholesterol?

   a. soluble fiber
   b. insoluble fiber
   c. both a & b
   d. none of the above

4. Which of the following contain dietary fiber?

   a. poultry
   b. diary products
   c. seafood
   d. none of the above

5. A food labeled "Cholesterol Free"

   a. can have small amounts of cholesterol in it
   b. can contain cholesterol but no more than 40 milligrams
   c. is a safe choice for someone with high cholesterol
   d. is not necessarily a good choice for someone with high cholesterol

6. Ingredients on food labels are listed:

   a. by quality first
   b. in alphabetical order
   c. by quantity first
   d. in no specific order

PLEASE CIRCLE THE CORRECT RESPONSE:

Any vegetable oil is an acceptable ingredient for people with high cholesterol?

T F

In the foods we eat, cholesterol and fat are identical?

T F

The cholesterol in our blood comes only from the food we eat?

T F

Saturated fats raise your cholesterol more than anything else in your diet?

T F

There is such a thing as "good" cholesterol?

T F

If your cholesterol is at the desirable range, you don't have to be tested for another five years?

T F

APPENDIX E

DEMOGRAPHIC QUESTIONNAIRE

PLEASE COMPLETE ALL QUESTIONS BEFORE RETURNING YOUR QUESTIONNAIRE.
All information is private and strictly confidential

NAME: (Print) _____

DEPARTMENT: _____ LOCATION: _____ EXTENSION: _____

SEX: Male [ ] Female [ ]

AGE:
20 -29 [ ]
30-39 [ ]
40-49 [ ]
50-59 [ ]
60-Up [ ]

RACE:
[ ] Black
[ ] White
[ ] Aleutian, Alaska native, Eskimo or American Indian
[ ] Asian
[ ] Pacific Islander
[ ] Hispanic
[ ] other _____

Highest Grade completed in School:

[ ] Grade school or less
[ ] Some high school
[ ] High school graduate
[ ] Some college
[ ] College graduate
[ ] Some post graduate
[ ] Post graduate or Professional degree
[ ] Business school graduate

SMOKING:

Have you smoked at least 100 cigarettes in your entire life? [ ]Yes [ ]No

Do you smoke cigarettes now?
[ ] Yes [ ] No

How old were you when you first started smoking cigarettes fairly regularly?
_____years

On the average, about how many cigarettes a day do you now smoke? _____

FAMILY HISTORY:

Please identify any member of your immediate family (grandparents, mother, father, brother, sister) that has been treated for or diagnosed to have any of the following conditions.

RELATIONSHIP

Diabetes _____
Heart or Cardiovascular Disease _____
Stroke _____
High Blood Pressure _____
High Cholesterol _____

APPENDIX F

MOTIVATION QUESTIONNAIRE

NAME: _____
(Please PRINT)

Healthworks

HEALTHLINE

Blue Cross and Blue Shield of Texas, Inc.

DIRECTIONS: For each item, circle the number that represents the extent to which you feel the question is important as it relates to your cholesterol levels. Circle only one number for each question. There are no right or wrong answers.

1. How important is reducing your present level of cholesterol to those which are safe (i.e., under 200)?

1 2 3 4 5 6 7 8 9
not at all important very important

2. How hard are you willing to work to accomplish this goal of 200 mg/dl?

1 2 3 4 5 6 7 8 9
not at all very hard

3. How important would the addition of being eligible to receive two tickets to San Antonio be toward your motivation to reach this goal?

1 2 3 4 5 6 7 8 9
not at all important very important

APPENDIX G

FOOD DIARY

MONITORING YOUR PROGRESS

♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥

DAY 7

♥♥♥♥♥♥♥♥♥♥♥♥♥♥♥

Food	*SF1 Value*	*SF2 Value*	*Cholesterol*
Daily Total			

APPENDIX H

BLOOD RESULTS MEMO

MEMORANDUM

TO: Blood Screening Participants DEPT: DATE: 10/05/89

FROM: W. A. Godfrey, Jr., M.D. DEPT: Medical Rel. EXT: 6071

SUBJ: **HEALTHWORKS BLOOD SCREENING**

Thank you for participating in the Healthworks blood screening. Your blood results have been processed and may be picked up on Tuesday, October 10, in the Auditorium from 9:00 to 9:30 a.m. I am looking forward to meeting with you to share current information about blood chemistry values and answer any questions you may have about your results.

It is important that you attend the session at the above mentioned time.

Thank you.

WAG

WAG/eh

Attachment

APPENDIX I

WAIVERS

THE STATE OF TEXAS §
§ RELEASE FROM LIABILITY
COUNTY OF _____ § HEALTHY HEART PROGRAM STUDY

Blue Cross and Blue Shield of Texas, Inc., having a firm belief in the value of providing health related information for its employees, has made available for them the opportunity to participate in a study to evaluate high blood cholesterol information programs. Blue Cross and Blue Shield of Texas, Inc. does not have the resources to evaluate each employee's health and fitness status to determine whether the employee should or should not participate in such a study and has not made such an evaluation. The decision to participate must be made by each employee in consultation with his or her personal physician and/or other health professionals. Participation in the study is strictly voluntary and no employee is obligated to do so.

There are inherent risks of injury which characterize any study of this kind, even for the most fit or healthy participant. These risks place practical limitations on the ability of Blue Cross and Blue Shield of Texas, Inc. or any other party to minimize or prevent injury to employees participating in such studies. Safe and beneficial participation requires the thoughtful and cautious participation of the employees themselves--fully recognizing at all times their own individual abilities and limitations. Injury resulting from participation in the study would not be considered to be work related and would be handled the same as any other injury under the employee's health benefit plan.

In consideration of the above factors, the undersigned participant acknowledges the existence of risks in connection with the study, assumes such risks and agrees to accept responsibility for any injuries sustained by him or her in the courses of his or her participation whether conducted by BCBST employees, independent contractors, or other parties.

The Participant further acknowledges the need for rules and procedures related to such studies and agrees to abide by any and all such rules and procedures. He or she also understands that Blue Cross and Blue Shield of Texas, Inc. is not liable for any loss, damage or destruction of personal items resulting from participation in such study.

Having read and understood the preceding, the participant acknowledges his or her awareness and understanding of the risks set forth herein and knowingly agrees to accept full responsibility for his or her own exposure to such risks as a condition of participation.

I, the undersigned Participant, hereby affirm that my participation in the Healthy Heart Program study is voluntary, and by my own choice, and I do hereby expressly forever release, discharge and hold harmless, on behalf of myself, my executors, administrators and assignees, Blue Cross and Blue Shield of Texas, Inc., their successors and assigns, as well as their directors, officers, employees, agents and independent contractors, from any and all responsibility and liability for claims, actions, demands or causes of action on account of injury, death, or damages or other consequences which may arise from my voluntary participation in said study, including without limitation those damages resulting from acts of active or passive negligence.

This release is not intended to apply to valid claims filed pursuant to any life, health or accident insurance policy or coverage issued or underwritten by Blue Cross and Blue Shield of Texas, Inc.

_____

Participant (Date)

THE STATE OF TEXAS §
§
COUNTY OF _____ §

CONSENT TO RELEASE
MEDICAL INFORMATION

I, the undersigned Participant, an employee of Blue Cross and Blue Shield of Texas, Inc. do hereby authorize and consent that Blue Cross and Blue Shield of Texas, Inc. release to third parties, including students conducting graduate level thesis projects, any and all medical and insurance information, of whatever nature, now in their possession or later acquired, from whatever source, which pertains or relates to The Healthy Heart Program study obtained during the period _____ through _____. This authorization and consent is granted for the sole and limited purpose of disseminating information pertaining to high blood cholesterol information programs.

I understand and agree that by consenting to and granting this authorization for release of the above information I am waiving any right or claim of confidentiality or privilege concerning the information described, when used for the purposes described, which may exist under the Texas Medical Practices Act, the Texas Mental Health Code, the Texas Insurance Code, the Texas Rules of Evidence, the Texas Rules of Criminal Evidence, the Texas Communicable Disease Prevention and Control Act or any other state or federal law, including any Common Law right or claim.

I further understand and agree that I may withdraw my authorization and consent at any time by written notice of withdrawal to Blue Cross and Blue Shield of Texas, Inc., provided however, that any such withdrawal will not affect any information disclosed prior to receipt by Blue Cross and Blue Shield of Texas, Inc. of the written notice of withdrawal.

_____
Participant (Date)

THE STATE OF TEXAS §
§ **HEALTHY HEART PROGRAM**
COUNTY OF _____ § **PARTICIPATION AGREEMENT**

WHEREAS, *Blue Cross and Blue Shield of Texas, Inc. (hereinafter "BCBST") is desirous of conducting a study to obtain information on how best to provide knowledge, awareness and instructions to employees regarding the causes of high blood cholesterol; and*

WHEREAS, *BCBST has developed a program called "Healthy Heart" which it wishes to study and evaluate; and*

WHEREAS, *the undersigned party (hereinafter "Participant") wishes to participate in said study program.*

NOWTHEREFORE, *premises considered, Participant agrees to participate in the Healthy Heart Program study as specified herein.*

1. *The study program shall be of six weeks duration.*

2. *At least two blood screenings will be conducted to determine Participant's cholesterol level.*

3. *Participant will be expected to attend educational sessions and complete dietary surveys and questionnaires upon request.*

4. *In certain cases, follow-up activity may be required for several months.*

5. *All information obtained during the study will be kept confidential by BCBST; but may be released for educational purposes such as for graduate school level thesis projects.*

6. *Participant may withdraw from the study at any time.*

7. *All participants will be given a summary of the study results upon its completion.*

It is understood that there are inherent risks involved in any study of this kind. As a condition of participation in this study, Participant agrees to execute the attached Release from Liability which is hereby incorporated and made a part of this Agreement.

As a further condition of participation in this study, Participant agrees to execute the attached Consent to Release Medical Information which is hereby incorporated and made a part of this Agreement.

I, the undersigned Participant, hereby affirm that I have read and understand the preceding, including the attached release and consent documents, and that my participation in the Healthy Heart Program study is voluntary, by my own choice and not the result of threat or coercion.

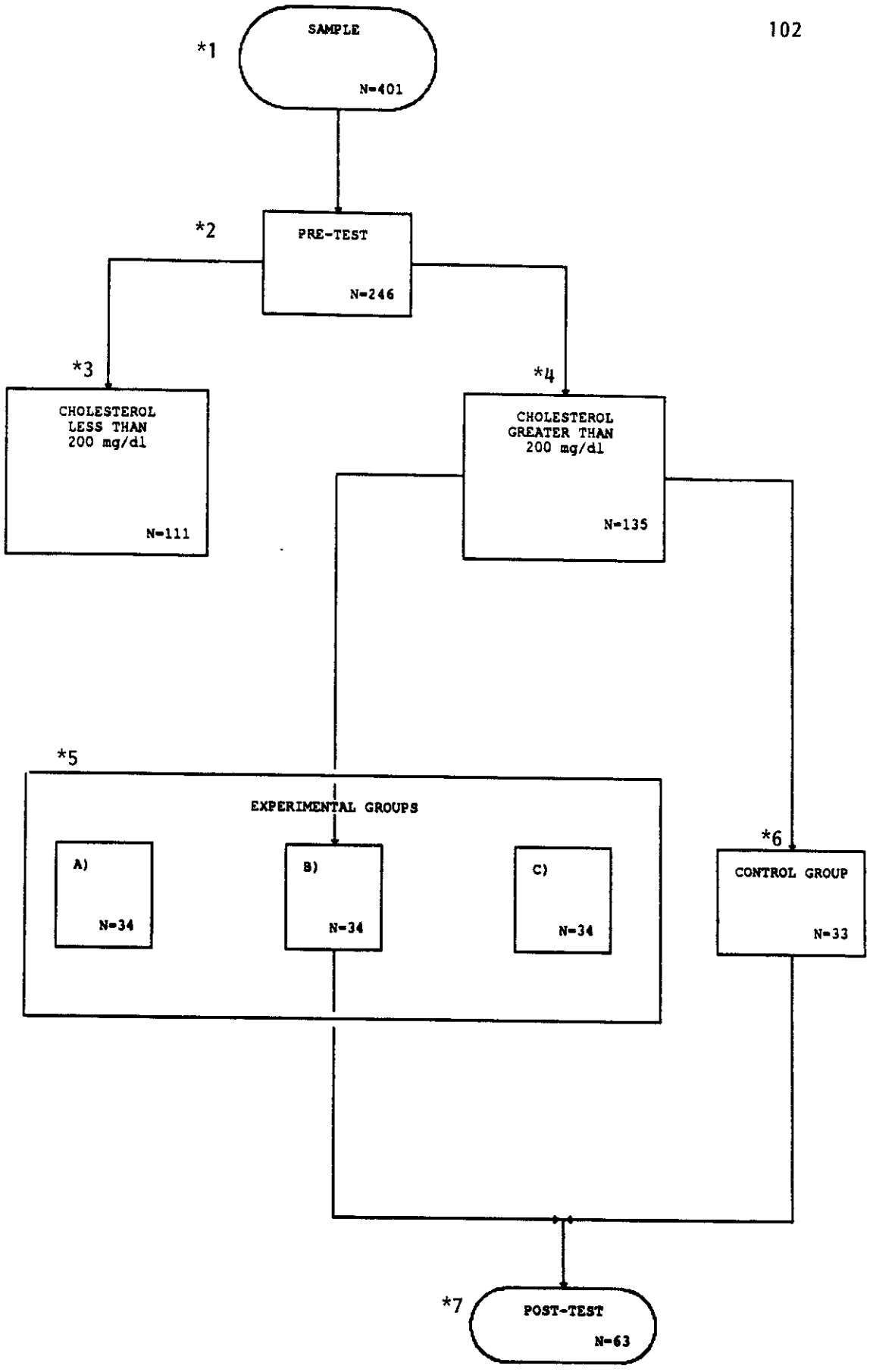
IN WITNESS WHEREOF, *I have hereunto set my hand this ___ day of _____, 19___.*

_____
Participant

_____
Witness

APPENDIX J

DESIGN OF PROJECT


*1
SAMPLE
N=401
*2
PRE-TEST
N=246
*3
CHOLESTEROL
LESS THAN
200 mg/dl
N=111
*4
CHOLESTEROL
GREATER THAN
200 mg/dl
N=135
*5
EXPERIMENTAL GROUPS
A)
N=34
B)
N=34
C)
N=34
*6
CONTROL GROUP
N=33
*7
POST-TEST
N=63

*1. - Sample of Blue Cross and Blue Shield employees in Medical, Comptroller, and Claims divisions (N = 401)

- Interoffice Memos sent to all employees and registration notebook distributed by department coordinators

*2. - Pre-Assessments (n = 246)

- Blood variables: Cholesterol, Triglycerides, HDL, LDL, TC/HDL ratio

- Other variables: Blood Pressure, Weight, and Questionnaires

*3. - Mail letter to pick up results to all individuals with cholesterol less than 200 mg/dl. (n = 111)

*4. - Mail letters to pick-up results to all individuals with cholesterol levels greater than 200 mg/dl. (n = 135)

- Random assignment to experimental and control groups

*5. - Experimental Group A (n = 34)

- Group meeting to return blood results

- Distribute schedule for intervention course

- Sign waivers and release forms

- Experimental Group B (n = 34)

- Group meeting to return blood results

- Distribute schedule for intervention course

- Sign waivers and release forms

- Experimental Group C (n = 34)
- Group meeting to return blood results
- Inform about incentives
- Sign waivers and release forms

*6. - Control Group D (n = 33)
- Group meeting to return blood results
- Inform about free follow-up blood tests
- Sign waivers and release forms

*7. - Post-Assessments (n = 63)
- Blood variables: Cholesterol, Triglycerides, HDL, LDL, TC/HDL ratio
- Other variables: Blood Pressure, Weight, and Questionnaires

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