THE EFFECT OF A CORONARY ARTERY RISK EVALUATION PROGRAM ON SERUM LIPID VALUES AND CARDIOVASCULAR RISK LEVELS

SANDRA L. BRUCE AND SUSAN K. GROVE

In this study, serum lipid and cardiovascular risk levels of 195 military men and women were measured immediately before and 6 months after participation in a coronary artery risk evaluation (C.A.R.E.) program. Mean total cholesterol levels decreased from 257 mg/dl to 223 mg/dl ($t_{(194)} = -16.76$, $p = 0.00$), *low-density lipoprotein levels decreased from 170 mg/dl to 141 mg/dl* ($t_{(194)} = -15.22$, $p = 0.00$), *and high-density lipoprotein levels increased from 45 mg/dl to 48 mg/dl* ($t_{(194)} = 3.27$, $p = 0.01$). *Cardiovascular risk categories (based on serum lipid levels) were lowered from high to moderate risk in 54 subjects, high to low risk in 19 subjects, and moderate to low risk in 31 subjects* ($\chi^2 = 98.28$, $p = 0.00$). *This study demonstrates that health education programs such as the C.A.R.E. Program can have a significant impact on serum lipid levels and cardiovascular risk levels and can potentially improve the health of high-risk populations.*

Cardiovascular diseases cause nearly one of every two deaths in adults 45 years and older (American Heart Association, 1988). "It ranks first in terms of social security disability and second only to all forms of arthritis for limitation of activity, and to all forms of cancer combined for total hospital stays. In direct health care costs, lost wages, and productivity, coronary artery disease (CAD) costs the United States more than $60 billion a year" (Lipid Research Clinics [LRC] Program, p. 351).

Risk factors for CAD include male gender, family history of premature CAD, diabetes mellitus, hypertension, high cholesterol, cigarette smoking, and obesity (Expert Panel, 1988). The first three risk factors cannot be changed; however, the last four factors can be modified. Education can promote changes in daily living that reduce the risk for CAD (Glanz, 1988). The National Center for Health Statistics reports that slightly over 50% of Americans aged 20 to 74 have total blood cholesterol levels above the desirable level of 200 mg/dl. About 25% of the adult population is at high risk of CAD owing to levels of 240 mg/dl or greater and are candidates for intervention (Sempos, Fulwood, Haines, & Cleeman, 1989).

Cholesterol is transported in the blood by lipoproteins. The low-density lipoprotein (LDL) carries most of the blood's cholesterol; high levels of LDL lead to atherosclerosis. The high-density lipoprotein (HDL) carries less of the blood cholesterol and helps prevent cholesterol deposition in the arteries (Kwiterovich, 1989). The goal of all risk-factor reduction strategies is to change blood lipid profiles from a "bad" one (high LDL, low HDL) to a "good" one (low LDL, high HDL). The purpose of this descriptive study was to compare a military population's mean levels of total serum cholesterol, LDL, HDL, and risk for cardiovascular disease (based on serum lipid levels) before and 6 months after a coronary artery risk evaluation (C.A.R.E.) program.

Burns, N. & Grove, S.K. (1997). *Study guide for the practice of nursing research: conduct, critique, and utilization. Philadelphia: W.B. Saunders Company*

BACKGROUND

The Framingham study provided the first strong link between cholesterol, lipoproteins, and coronary artery disease in men and women (Kannel, Castelli, Gordon, & McNamara, 1971). Study results suggested that total serum cholesterol was the best indicator of CAD; people with elevated LDL cholesterol were more at risk than those with low levels of LDL. In addition, people with normal total cholesterol and low HDL cholesterol were more prone to cardiovascular disease than those with normal cholesterol and high HDL. For people at high risk for CAD, drugs were used to reduce their risk levels.

The LRC Coronary Primary Prevention Trial (1984) was a double-blind study that examined the effect of the lipid-lowering drug cholestyramine on the serum lipid levels and incidence of coronary events (number of heart attacks and deaths due to CAD) in approximately 4,000 men. Both the treatment group and the control group were placed on a low-saturated fat diet. Results from this trial demonstrated an 8.5% reduction in LDL cholesterol for the treatment group; this reduction was associated with a 19% reduction in CAD risk (LRC, 1984). These findings suggested that for every 1% reduction in blood cholesterol, CAD risk is reduced by 2% (National Institutes of Health [NIH], 1985).

The results of three clinical trials, the LRC Coronary Primary Prevention Trial (1984), The National Heart, Lung, and Blood Institute's Coronary Trial (NIH, 1985), and the Cholesterol-Lowering Atherosclerosis Study (Blankenhorn et al., 1987) found that an increase in HDL cholesterol produced a reduction in coronary artery disease in addition to the beneficial effect of lowering the LDL level (Kwiterovich, 1989). The Helsinki Heart Study was a rigorous experimental study on 4,081 asymptomatic, hypercholesterolemic men treated with a cholesterol-lowering diet or diet plus gemfibrozil (Fricke et al., 1987). Results demonstrated an 8% increase of HDL cholesterol and a 34% decrease in incidence of coronary events in the latter group. These results suggest that for every 1% increase in HDL level, there is about a 3% decrease in risk for CAD. This does not negate the additive effect of all risk factors in the development of CAD, but rather highlights the influence that serum LDL and HDL have in predicting risk (Cornett & Watson, 1984).

Nonpharmacological interventions also may be effective in reducing serum cholesterol. Peterson, Lefebvre, and Ferreira (1986) reported a 10.9% cholesterol reduction 6 months after intervention (one-time screening, counseling, health referrals, and follow-up screening), and Quigley (1986) reported a 14% reduction in total cholesterol 8 months after intervention (screening, two 1-hour education sessions about cholesterol, and rescreening). The New York Telephone Company Trial reported a greater decrease in cholesterol (8.8%) in the treatment group (8-week education program that included nutrition education and training in self-management skills) than the control group (2.4%), as well as significantly greater weight loss (Bruno, Arnold, Jacobson, Winick, & Wynder, 1983). Each of these studies demonstrated positive effects from risk reduction education (Glanz, 1988).

Blair, Bryant, and Bocuzzi (1988) reported findings from an 18-month study conducted in a nurse-managed clinic for hyperlipidemic military personnel and their dependents. The subjects ($N = 86$) had cardiovascular disease and were treated with a cholesterol lowering diet and drugs. Thirty-two (37%) of the subjects were able to lower their mean cholesterol from 299 mg/dl to 241 mg/dl (19% reduction) on dietary therapy alone, and 54 (63%) achieved a 25% decrease in mean cholesterol from 310 mg/dl to 231 mg/dl on diet and drug therapy. This study highlighted the effectiveness of nursing interventions in individuals with hyperlipidemia.

In March 1988, the Strategic Air Command Surgeon General directed medical facilities to provide a means for military members to voluntarily obtain information regarding their lipid status and risk for cardiovascular disease. The staff of an outpatient primary care clinic in Texas developed the C.A.R.E. program to effect positive health outcomes (reduction in CAD risk) through a lipid screening and education intervention. This study evaluated the relationship between an education intervention (the C.A.R.E. program) and health outcomes (decreased serum lipids and cardiovascular risk). The following research question was developed for the study: What is the difference in the mean total serum cholesterol, LDL cholesterol, and HDL cholesterol and cardiovascular risk levels of military members before and after participation in the C.A.R.E. program?

METHOD

Sample: The setting was the outpatient primary care clinic of a 140-bed military hospital that serves men and women who are active duty or retired from active duty as well as their dependents over the age of 16 years. The C.A.R.E. program was advertised in the clinic lobby and the base newspaper as a service for anyone interested in learning about their lipid levels and risk of heart disease. Although it was mandated by the Strategic Air Command Surgeon General to provide this service, participation was voluntary.

The Expert Panel of the National Heart, Lung, and Blood Institute's National Cholesterol Education Program (NCEP) has established guidelines for detecting, evaluating, and treating hypercholesterolemia. These guidelines formed the standards for the intervention used in this study (Figure 1). As a result of the growing understanding about the role of cholesterol in CAD, the NCEP was developed to inform health professionals and the public about the importance of monitoring serum cholesterol levels (Expert Panel, 1988).

The C.A.R.E. program was conducted for a period of one year, and a total of 483 individuals were voluntarily screened. Fifteen of these individuals were referred immediately to the internal medicine clinic because of dangerously high lipid values (serum cholesterol greater than 300 mg/dl) and two or more nonlipid risk factors. These individuals were not included in the study sample. Those with cholesterol values less than 200 mg/dl (and the absence of other nonlipid risk factors) were considered low risk. Owing to their low risk, these individuals (n = 122) were instructed to have follow-up blood levels drawn in one year and were not included in the sample. One hundred twenty-seven individuals did not return for follow-up evaluation and were not included in the study sample. Twenty-four of the individuals screened did not meet the following sample criteria: (a) greater than 16 years of age; (b) military members (active duty, retired, or dependent); (c) not under pharmacological treatment for hyperlipidemia; (d) English-speaking; (e) triglycerides under 400 mg/dl (this criterion was set because the calculation for LDL is not accurate for individuals with triglyceride values greater than 400 mg/dl); (f) nondiabetic; and (g) no current referrals to other health providers. Of the 483 individuals screened, 195 became research subjects. A power analysis was performed to confirm the adequacy of the sample size (Cohen, 1977).

Figure 1. C.A.R.E. guidelines adapted from the NCEP. (Reprinted from Expert Panel, 1988.)

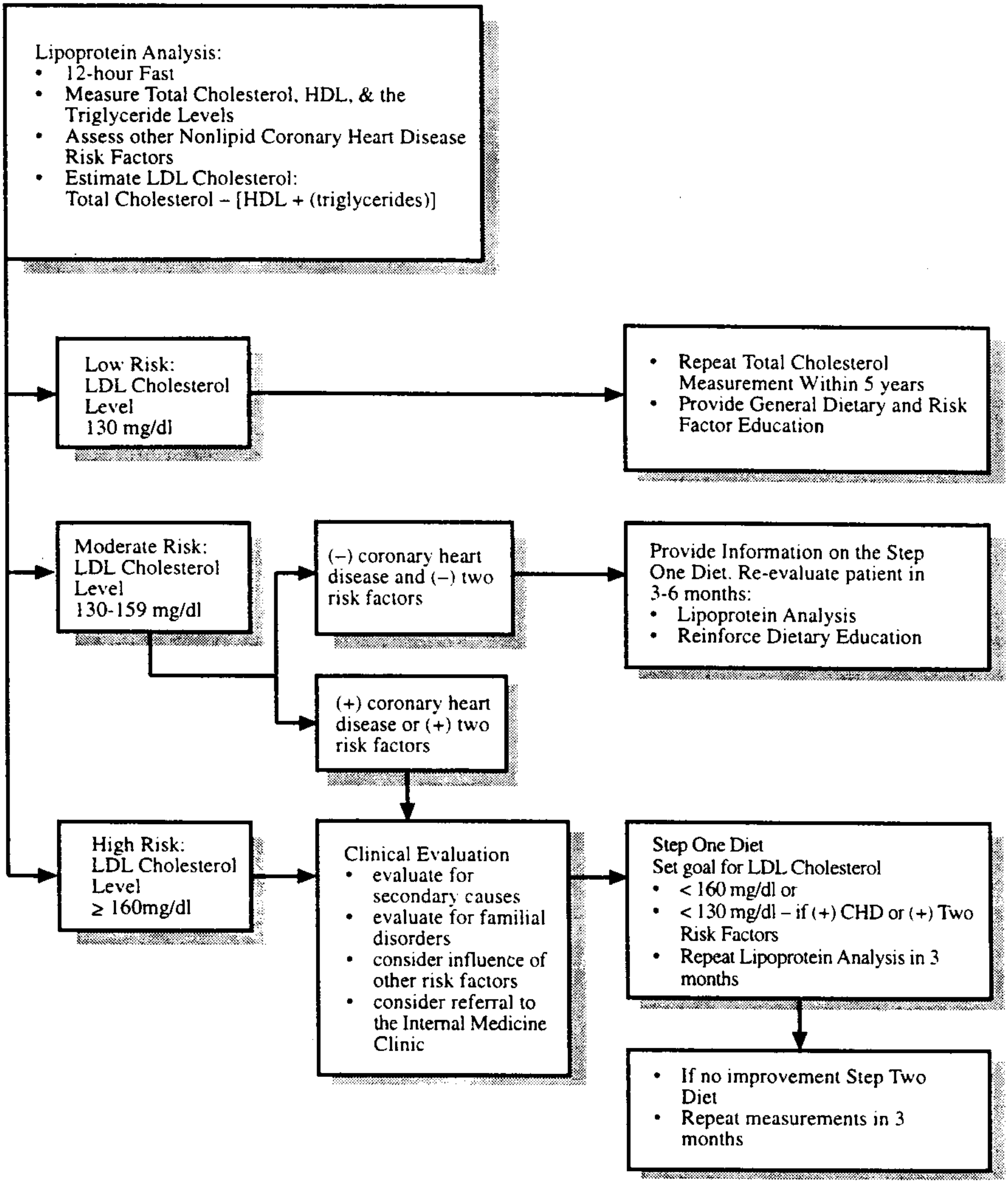


Table 1. Means, standard deviations, and ranges of the physiological attributes of the sample (92 men and 103 women).

ATTRIBUTE	$\bar{x}$	*SD*	RANGE
[a]BMI (Kg/cm^2)	25.03	2.82	19.57-37.19
SBP (mmHg)	135.08	17.72	100-178
DBP (mmHg)	82.98	8.51	54-102
Heart Rate	85.33	8.11	64-104
Serum Glucose (mg/dl)	97.83	13.83	72-130

Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; BMI, body mass index.
[a]BMI: 19 = lean; 25 = average; 31 = heavy (Kwiterovich, 1989).

The sample consisted of 92 men and 103 women and included 36 married couples. The subjects ranged from 20 to 80 years of age, with a mean age of 53.33 years (± 13 SD). Information about the subjects' body mass index (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate, and glucose are provided in Table 1. The means for these variables were within normal limits.

Procedure: The data (serum lipid values and individual risk factor information) were obtained through retrospective medical record review and coded in order to protect the subject's identity. Measurements of the total serum cholesterol, the HDL, the LDL, and the estimated cardiovascular risk level were compared before and 6 months after participation in the program. The C.A.R.E. program was a voluntary program that offered screening, evaluation, and cardiac risk reduction education to all eligible military personnel. Screening consisted of an interview by the nurse manager of the program to determine individual risk factors and to provide instructions for obtaining a fasting lipid profile and glucose. The participants also had their height, weight, and blood pressure checked. Each person then was enrolled in the next available C.A.R.E. class.

In the evaluation phase, the program nurse, in conjunction with the clinic physician, assessed the person's cardiac risk status based on reported risk factors and the results of the serum lipid profile, according to NCEP guidelines. Each C.A.R.E. participant was determined to have low, moderate, or high risk for cardiovascular disease. Recommendations were made based on this risk classification and individual considerations. These recommendations included dietary guidelines, exercise guidelines, follow-up instructions, and in some cases, formal referrals to other resources.

The educational phase of the program involved attending a C.A.R.E. class. This 90-minute class provided instruction concerning cardiovascular health, emphasizing the relationship between daily living behaviors, and identification of risk factors that determine one's risk for heart disease. At the beginning of this group session, each participant was given a handout that included the following information: their serum lipid profile results; their risk classification (high, moderate, or low); and specific individualized recommendations. The results of the lipid profiles and risk-level evaluations were explained in detail. Dietary instruction on the Step-One Diet

(Table 2) was provided, as recommended by the Expert Panel (1988). Copies of the Step-One Diet were given to each person. General behavioral changes were recommended to the participants, such as reducing sedentary behaviors and maintaining ideal body weight. At the close of the class, recommendations and follow-up instructions were discussed with each participant individually. The subjects also received follow-up screening and counseling (based on rescreening results) 6 months after the start of the program.

Measures: A standardized protocol for lipid data collection, prescribed by the NCEP, was followed by each subject: (a) fast for 12 hours; (b) maintain stable dietary patterns for at least 3 weeks; (c) maintain stable body weight; (d) be neither ill nor pregnant; and (e) have no recent history of myocardial infarction, less than 3 months. The laboratory values of total serum, LDL, and HDL cholesterol from this agency met the referenced criteria (± 3% of the true value) set by the NCEP. The true value is an accepted reference value, established by the National Bureau of Standards (NBS) or the Centers of Disease Control (Finney, 1990). The level of LDL cholesterol was calculated using the following equation developed by Friedewald, Levy, and Fredrickson (1972): Total cholesterol – [HDL cholesterol + triglycerides/5] = LDL.

Table 2. Dietary guidelines to lower blood cholesterol.

	Recommended Intake	
Nutrient	Step-One Diet	Step-Two Diet
Total fat	<30% of total calories	<30% of total calories
Saturated fatty acids	<10% of total calories	<7% of total calories
Polyunsaturated fatty acids	0% to 10% of total calories	0% to 10% of total calories
Carbohydrates	10% to 15% of total calories	10% to 15% of total calories
Protein	50% to 60% of total calories	50% to 60% of total calories
Cholesterol	10% to 20% of total calories <300 mg/day To achieve and maintain desirable weight	10% to 20% of total calories <200 mg/day To achieve and maintain desirable weight

Reprinted from Expert Panel (1988).

RESULTS

The most prevalent nonlipid risk factor present for this sample was a family history of coronary artery disease; 73 (37.4%) of the subjects reported that definite myocardial infarction or sudden death had occurred before the age of 65 years in a parent or sibling. Incidence of other reported risk factors were as follows: cigarette smoking, 22.1%; hypertension (SBP 140 mm/Hg; DBP 90 mm/Hg), 15.9%; obesity (greater than or equal to 30% over ideal body weight), 5.6%; and diagnosed coronary artery disease, 3.1%.

Six months after participation in the C.A.R.E. program, the mean total cholesterol was reduced by 33.82 mg/dl ($t(194) = -16.76$, $p = 0.00$), and the mean LDL level was reduced by 28.97 mg/dl ($t(194) = -15.22$, $p = 0.00$). The mean HDL cholesterol was increased by 2.75 mg/dl ($t(194) = 3.27$, $p = 0.001$) (Table 3).

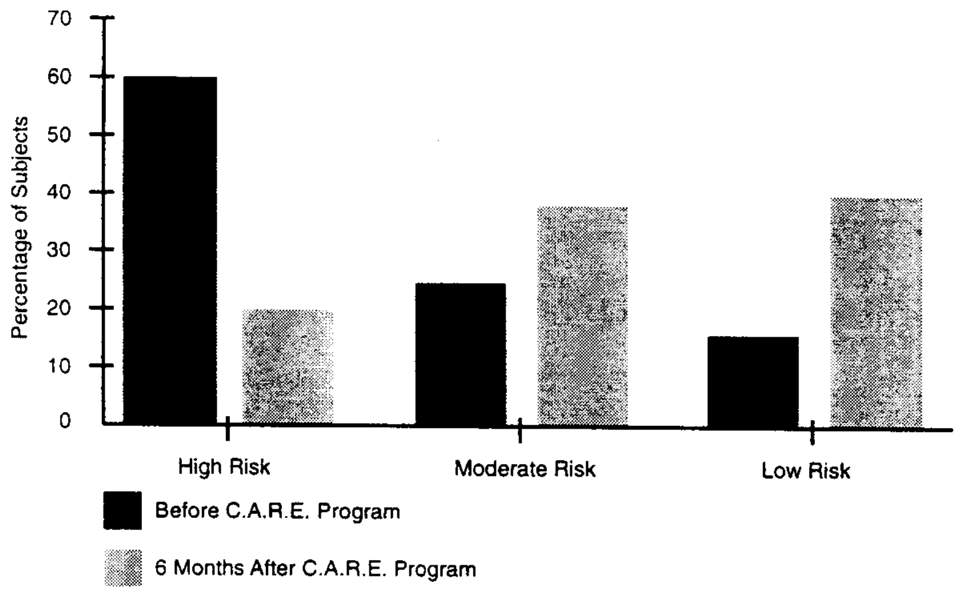
Table 3. Baseline and follow-up mean cholesterol levels (mg/dl) in study population (92 men and 103 women).

	Baseline		Follow-Up			
TYPE OF CHOLESTEROL	$\bar{x}$	*SD*	$\bar{x}$	*SD*	*t* VALUE	*p*
Total serum cholesterol	257.20	36.43	223.38	34.05	−16.75	0.0000
LDL cholesterol	170.40	36.52	141.43	32.24	−15.22	0.0000
HDL cholesterol	44.83	15.01	47.58	13.00	+3.27	0.0012

Abbreviations: LDL, low-density lipoprotein; HDL, high-density lipoprotein.

The risk levels of the subjects before and 6 months after the C.A.R.E. program were compared. Using a 3 × 3 – chi-square table, the sample was categorized into low, moderate, and high risk for cardiovascular disease based on the serum lipid profile and nonlipid risk factors before and after participation (Figure 2). The number of subjects in the high-risk category before partici-

Figure 2. Percentage of subjects in each cardiovascular risk category before and after treatment ($P = .0000$).



pation was 116 (59.5%) and was reduced to 45 (23.1%) after participation; 50 (25.6%) were in the moderate-risk category before participation and 71 (36.4%) after participation; and 29 (14.9%) were in the low-risk category before participation and 79 (40.5%) after participation. The increased number of subjects in the moderate-risk group after participation is accounted for by the movement of high-risk individuals to the moderate-risk category. Cardiovascular risk categories were lowered from high to moderate risk in 54 subjects; high to low risk in 19 subjects; and moderate to low risk in 31 subjects; 43 remained high risk; 17 remained moderate risk; and 29 remained in low risk. Only two individuals went from moderate to high risk. Significant changes in risk factor categorization were noted using an extension of the McNemar Test for Significance of Changes (Bowker, 1948; McNemar, 1947). The value obtained (χ^2 greater than 98.285, $p = 0.00$) was 12.6 times larger than the critical value of $\chi^2 = 7.815$ (0.95, $df = 3$), demonstrating a significant difference in the cardiovascular risk levels of the group posttreatment.

DISCUSSION

The screening process was beneficial in identifying individuals with health risks. Fifteen individuals were referred for medical intervention because of dangerously high cardiovascular risk levels. Eleven other subjects were referred for evaluation of hypertension, and 6 subjects were referred for elevated fasting serum glucose levels.

As expected, strong correlations were found between cardiovascular risk and the total cholesterol level ($r = .67$, $p = .000$; 44% variance explained) and the LDL cholesterol level ($r = .80$, $p = .000$; 64% variance explained). However, HDL cholesterol did not correlate significantly with cardiovascular risk level ($r = -.12$; 1.5% of the variance explained), which is unexpected because the literature supports this correlation (Lipid Research Clinics Program, 1984; Fricke et al., 1987; Levy et al., 1984; Pocock, Shaper, & Phillips, 1989).

A significant 13% decrease in the mean total serum cholesterol level occurred after participation in the C.A.R.E. program. Based on the premise that a 1% reduction in serum cholesterol produces a 2% reduction in cardiovascular risk, the participants in this study could have achieved an overall 26% reduction in risk for coronary heart disease (LRC, 1984; NIH, 1985). Several nonpharmacological cardiovascular education intervention studies reported similar reductions in total serum cholesterol levels. Peterson and colleagues (1986) reported a 11% mean reduction of total cholesterol 6 months after intervention; Quigley (1986) reported a 14% reduction in total cholesterol levels 8 months after an education program; and Bruno and colleagues (1983) reported a 9% reduction 6 months after intervention. Thus, the 13% reduction in total serum cholesterol after the C.A.R.E. program was consistent with other nonpharmacological education interventions.

Mean LDL levels decreased 17% after participation in the C.A.R.E. program. A LDL level greater than 160 mg/dl constitutes high risk for cardiovascular disease regardless of the presence of other risk factors. The participants in the C.A.R.E. program reduced their mean LDL level from 170.40 to 140.43 mg/dl (17% reduction) and on the basis of this factor alone lowered their overall risk classification from high to moderate.

Mean HDL cholesterol level increased 5.8% after participation in the C.A.R.E. program. Results from the Helsinki Heart Study suggest that for every 1% increase in HDL level, a 3% decrease in risk for CAD occurs (Fricke et al., 1987). According to this premise, the study subjects decreased their risk for coronary heart disease by 17.4%.

The majority (99.5%) of the subjects either decreased their cardiovascular risk classification or remained in the same classification after participation in the C.A.R.E. program. Only 2 (1%) of the 195 participants increased their risk levels (from moderate to high risk). This could be attributed to noncompliance to the C.A.R.E. program guidelines or familial hyperlipidemia (Kwiterovich, 1989). The latter may require pharmacological intervention. Overall, positive changes in the participants' blood lipid levels and cardiovascular risk classification were noted after participation in the C.A.R.E. program.

Several factors must be considered when interpreting these findings. In this descriptive study, the original risk was based on the serum lipid profile and the presence of nonlipid risk factors as indicated by the Expert Panel (1988), and the changes in risk classification are based on changes in the lipid values only. Other variables known to affect cardiovascular risk (e.g., exercise, smoking, hypertension, body weight) were not reexamined after participation in the C.A.R.E. program. There may have been an even greater magnitude of change in risk classification if other risk factors were measured postparticipation. "Regression toward the mean" may have been responsible for some of the cholesterol reduction because single determinations were used to establish baseline and end-of-participation blood lipid levels (Green & Lewis, 1986). The findings may demonstrate an association between the C.A.R.E. program and the improvements in serum lipid values for the sample. However, quasi-experimental studies with control groups are needed to examine the full impact of the program.

Because the study was limited to 6 months after participation in the C.A.R.E. program, long-term trends were not examined. Future research should include longitudinal studies to assess the degree to which behavior changes are sustained over time. Examining different populations such as minorities, women, children, and the elderly would strengthen the findings. Finally, a cost-benefit analysis could highlight potential savings in terms of health-care costs for high-risk individuals.

Health education has long been an integral component of professional nursing. Indeed, nurses can be viewed as a primary source of health information. Education does not have to be lengthy to be beneficial. The simple changes corresponding to those of the NCEP's Step-One Diet can be recommended by a nurse in a few minutes. The results do support the use of educational programs in addition to risk factor assessment in reducing cardiac risk levels. Education can be effective in improving lipid profiles and potentially decrease the incidence of CAD. Decreasing risk for CAD and the associated loss of productivity, disability, and death could enhance quality of life. This study demonstrates that nurse-managed health education programs such as the C.A.R.E. program can have dramatic impact on individuals' health and can potentially improve quality of life for high-risk populations.

From the Sheppard Air Force Base, and the University of Texas at Arlington, TX.

SANDRA L. BRUCE, MSN, RN, CCRN: Major, United States Air Force, Nurse Corps, Sheppard Air Force Base, TX; SUSAN K. GROVE, PhD, RN: Professor, Assistant Dean, The University of Texas at Arlington School of Nursing.

Address reprint requests to Sandra L. Bruce, MSN, RN, CCRN, Major, United States Air Force, 383d Medical Training Squadron/NTOE, 939 Missile Rd, Suite 3, Sheppard Air Force Base, TX, 76311-2262.

0897-1897/94/0702-0004$0.00/0

References

AMERICAN HEART ASSOCIATION (1988). *Recommendations for treatment of hyperlipidemia in adults*. Dallas, TX: American Heart Association.

BLAIR, T.P., BRYANT, J., & BOCUZZI, S. (1988). Treatment of hypercholesterolemia by a clinical nurse using a stepped-care protocol in a nonvolunteer population. *Archives of Internal Medicine, 148*, 1046–1048.

BLANKENHORN, D.H., NESSIM, S.A., JOHNSON, R.L., SAN MARCO, M.E., AZEN, A.P., & CASHEN-HEMPHILL, L. (1987). Beneficial effects of combined colestipol-niacin therapy on coronary atherosclerosis and coronary artery vs bypass grafts. *JAMA, 257*, 3233–3240.

BOWKER, A.H. (1948). A test for symmetry in contingency tables. *Journal of the American Statistical Association, 43*, 572–574.

BRUNO, R., ARNOLD, C., JACOBSON, L., WINICK, M., & WYNDER, E. (1983). Randomized trial of a nonpharmacologic cholesterol reduction program at the worksite. *Preventive Medicine, 12*, 523–532.

COHEN, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence and Earlbam Associates.

EXPERT PANEL (1988). *Report of the National Cholesterol Education Program Expert Panel on detection, evaluation, and treatment of high blood cholesterol in adults* (US Dept of Health and Human Resources Publication No. NIH 88-2925.) Washington, DC: National Heart, Lung, and Blood Institute.

FINNEY, C.P. (1990). Measurement issues in cholesterol screening: An overview for nurses. *Journal of Cardiovascular Nursing, 5*(2), 10–22.

FRIEDEWALD, W.T., LEVY, R.I., & FREDRICKSON, D.S. (1972). Estimation of the concentration of low-density lipoprotein cholesterol in plasma, without the use of the preparative ultracentrifuge. *Clinical Chemistry, 18*, 499–502.

FRICKE, M.H., ELO, O., HAAPA, K., HEINONEN, O.P., HEINSALMI, P., HELO, P., HUTTUNEN, J.K., KAITANIEMI, P., KOSKINEN, P., MANNINEN, V., MAENPAA, H., MALKONEN, M., MANTTARI, M., NOVOLA, S., PASTERNICK, A., PIKKARAINEN, J. ROMO, M., SJOBLOM, T., & NIKKILA, E.A. (1987). Helsinki heart study: Primary prevention trial with gemfibrozil in middle-aged men with dyslipidemia. *New England Journal of Medicine, 317*, 1237–1245.

GLANZ, K. (1988). Patient and public education for cholesterol reduction: A review of strategies and issues. *Patient Education and Counseling, 12*, 235–257.

GREEN, L.W., KREUTER, M.W., DEEDS, S.G., & PARTRIDGE, K.B. (1980). *Health education and planning: A diagnostic approach*. Palo Alto, CA: Mayfield.

KANNEL, W.B., CASTELLI, W.P., GORDON, T., & MCNAMARA, P.M. (1971). Serum cholesterol, lipoproteins, and the risk of coronary heart disease: The Framingham study. *Annals of Internal Medicine, 74*, 1–12.

KWITEROVICH, P. (1989). *Beyond cholesterol: The Johns Hopkins complete guide for avoiding heart disease*. Baltimore, MD: Johns Hopkins University Press.

LEVY, R.F., BRENSIKE, J.F., EPSTEIN, S.E., KELSEY, S.F., PASSAMANI, E.R., RICHARDSON, J.W., LOH, I.K., STONE, N.I., ALDRICH, R.F., BATTAGLINI, J.W., MORIARTY, D.J., FISHER, M.L., FRIEDMAN, L., FRIEDEWALD, W., & DETRE, K.M. (1984). The influence of changes in lipid values induced by cholestyramine and diet on progression of coronary artery disease results of the NHLBI, type II coronary intervention study. *Circulation, 69*, 325–327.

LIPID RESEARCH CLINICS PROGRAM (1984). The lipid research clinics coronary primary prevention trial results I. Reduction in incidence of coronary heart disease to cholesterol lowering. *JAMA, 251*, 351–364.

MCNEMAR, Q. (1947). Note on the sampling error of the difference between correlated proportions or percentages. *Psychometrika, 12*, 153–157.

NATIONAL INSTITUTES OF HEALTH. (1985). Consensus development conference statement: Lowering blood cholesterol to prevent heart disease. *JAMA, 253*, 2080–2086.

PETERSON, G.S., LEFEBVRE, R.C., & FERREIRA, A. (1986). Strategies for cholesterol lowering at the worksite. *Journal of Nutrition Education, 18*(2), S54–S57.

POCOCK, S.J., SHAPER, A.G., & PHILLIPS, A.N. (1989). Concentrations of high density lipoprotein cholesterol, triglycerides, and total cholesterol in ischemic heart disease. *The British Journal of Medicine, 72*, 998–1002.

QUIGLEY, H.L. (1986). L. L. Bean cholesterol reduction program. *Journal of Nutrition Education, 18*(2) S58–S59.

SEMPOS, C., FULWOOD, R., HAINES, C., & CLEEMAN, J. (1989). The prevalence of high blood cholesterol levels among adults in the United States. *JAMA, 262*, 45–51.

Reprinted from Applied Nursing Research, *Vol. 7, No. 2 (May).*