

A Model for Cholesterol Reduction in a Corporate Research Setting

by Barbara L. Haselhorst, MS

Hypercholesterolemia, or elevated blood cholesterol, is one of the three major risk factors for coronary heart disease (CHD) (National Institutes of Health, 1987). More than half of all adult Americans have blood cholesterol levels of 200 mg/dL or greater, and approximately 25% have blood cholesterol levels over 240 mg/dL (Lenfant, 1987).

The worksite provides access to over 70% of individuals between ages 18 and 65 (U.S. Census Bureau, 1987). The opportunity for screening, intervention, follow up, education, and referral for employees with elevated blood cholesterol levels is unprecedented.

This article describes a model for the cholesterol reduction components of a cardiovascular risk reduction program (Figure 1), and addresses the following issues:

- Identification of employees at risk.
- A commercially available cholesterol treatment program as an intervention.
- Supportive environment for lifestyle changes.

BACKGROUND

Prior to the 1984 National Institutes of Health (NIH) Consensus Development Conference on Lowering Blood Cholesterol to Prevent

More than half of all adult Americans have blood cholesterol levels of 200 mg/dL or greater, and approximately 25% have blood cholesterol levels over 240 mg/dL.

Heart Disease, many adults were told by health professionals that blood cholesterol levels above 200 mg/dL were normal. Unfortunately, for Americans, "normal" and healthy are not synonymous terms for blood cholesterol levels.

Blood cholesterol levels associated with minimal or no heart disease average 150 mg/dL, compared to average overall cholesterol levels in the United States of 215 to 220 mg/dL (Figure 2). Heart attack victims and persons receiving coronary artery bypass grafts show an average blood cholesterol level of 230 to 240 mg/dL (Goor, 1987).

That elevated blood cholesterol is causally related to an increase of morbidity and premature mortality due to coronary heart disease is supported by scientific evidence (Goor,

1987; LaRosa, 1986a). The Framingham Study, a longitudinal study of cardiovascular disease and its risk factors, clearly demonstrated that the risk of CHD increases as blood cholesterol level rises (LaRosa, 1986b).

By 1984, results from the Lipid Research Clinics/Coronary Primary Prevention Trial (LRC/CPPT) showed that each 1% reduction in total cholesterol results in a nearly 2% reduction in CHD risk in middle aged men, 35 to 59 years old (LRC/CPPT, 1984). Further evidence from the Cholesterol Lowering Atherosclerosis Study (CLAS) and the Familial Atherosclerosis Trial Study showed that lowering cholesterol retards the progression of fatty plaques, and regression can occur with vigorous cholesterol lowering (LaRosa, 1990; Lenfant, 1990).

Despite more accurate diagnostic and state of the art technology, heart disease remains the leading cause of death in the United States, accounting for nearly 50% of all deaths (American Heart Association [AHA], 1988).

Atherosclerosis accounts for more than 90% of the cases of CHD (AHA, 1988; NIH, 1987). The American diet, rich in saturated fat, lays a foundation for CHD that begins in childhood. Over the next several

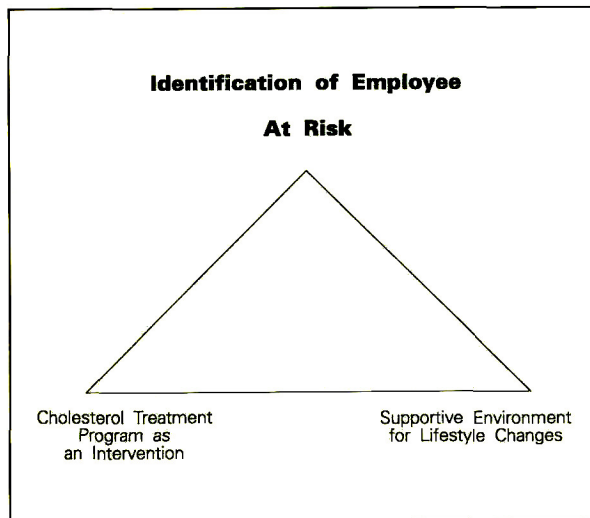


Figure 1: Model for cholesterol reduction at the worksite.

decades, the coronary arteries of an adult will narrow progressively from plaques composed of fat and cholesterol. For 50% of the victims of heart attack, treatment is not an option, because their first symptom is their last (Goor, 1987).

Employers have a vested interest in providing a work environment conducive to lowering an individual's risk of coronary heart disease. Coronary heart disease translates into a multitude of costs for both employer and employee: decreased efficiency, decreased morale, absenteeism, replacement and retraining costs, and increased health care costs (LaRosa, 1986b; O'Donnell, 1984).

While American industry struggles in an increasingly competitive global market, health care expenditures have risen to represent over 11% of the Gross National Product (LaRosa, 1986b). By 1980, employee health care costs had risen more than 500%, representing a cost to industry of over \$60 billion annually (Ostwald, 1986).

Health promotion programs at the

worksite may be effective in reducing the incidence of CHD due to elevated blood cholesterol levels in the employee population. The following worksite characteristics support this premise:

1. Employees spend 30% to 50% of their waking hours at the worksite.
2. Health care providers have continuous access to employees for screening, intervention, follow up, education, and referral.
3. Many employee meals and snacks are purchased at the worksite.
4. Restaurants and vending machines can offer low fat, low cholesterol food choices.
5. The relatively stable environment provides support for long term lifestyle changes (LaRosa, 1986b; O'Donnell, 1984; Schron, 1985).

Worksite health promotion programs can identify those employees with elevated cholesterol. The occupational health nurse is in an ideal position to identify these em-

ployees, manage long term follow up, and provide education. The nursing process facilitates the systematic assessment, planning, implementation, and evaluation of health promotion programs to reduce the risk of CHD for employee populations (Schron, 1985).

The long term goals of any program designed to educate employees about lifestyle changes are to decrease cardiovascular risk factors and reduce morbidity and premature mortality from cardiovascular disease. In the occupational setting, health care professionals may need to work closely with human resources personnel to compile employee health benefits data. Epidemiologic methods then can be used to evaluate program effectiveness in decreasing cardiovascular disease in the employee population. However, due to the nature of the development of cardiovascular disease, these results often are not measurable for many years.

PILOT PROGRAM

A cardiovascular risk reduction program (CVRRP) was designed and piloted in a corporate setting by a master's prepared nurse consultant. Early in the planning stage, a fact finding team consisting of an epidemiologist, systems analyst, and nurse consultant visited several major corporations with existing health promotion programs.

During these site visits several major areas were investigated: implementation, program components, use of health risk appraisal, evaluation, and type or availability of computer systems. The information and experience gained from these visits proved invaluable during the entire pilot project.

Following these visits, information from previous screenings and a health assessment survey were used to create a company health status profile. This process made it possible to target groups of employees with health problems and assess employee interest in a program. Meetings with management, health care professionals, and employee repre-

representatives began early in the program planning stage.

A corporate research facility with an employee population of 31% (384) females and 69% (876) males served as the pilot site for the cholesterol reduction component of the CVRRP. The primary objectives of the cholesterol reduction components of the CVRRP were to:

1. Identify employees with elevated blood cholesterol levels.
2. Offer risk reduction interventions to employees/spouses on site.
3. Provide recommendations and/or arrange for appropriate referral to community health services.
4. Provide follow up at work and ongoing evaluation.
5. Evaluate program effectiveness.

Identification of at Risk Employees

Employees were contacted through in-house mail to schedule an appointment with health services. Scheduling in advance was necessary for employees to receive information prior to their health assessment. An information packet was sent through in-house mail following confirmation of appointment.

This packet contained an introductory letter outlining the cardiovascular risk reduction program, a health history questionnaire, instructions for a fasting blood analysis, and a test kit for stool-occult blood. Lipoprotein analysis included measurements of total cholesterol, triglycerides, and high density lipoprotein (HDL). Low density lipoprotein (LDL) was calculated using the Friedewald formula:

$$LDL = \text{total cholesterol} - \text{HDL} - (\text{triglycerides}/5)$$

The health risk appraisal program used was a combination of a personal computer program developed by the Carter Center of Emory University with enhancements which allow the user to enter additional health and lifestyle information. Health assessment and health history questionnaire data were used to generate the health risk appraisal report.

The additional information did

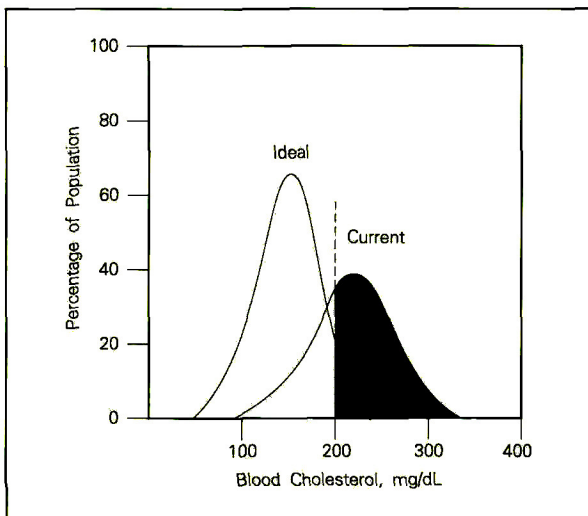


Figure 2: Comparison of ideal and current American population distributions. The ideal distribution of blood cholesterol levels exhibits lower levels than the current U.S. distribution and has an average of about 150 mg/dL as compared to 215 to 220 mg/dL. The current distribution shows over 50% of American adults have blood cholesterol levels above 220 mg/dL as compared to a small percentage of the ideal population (Goor, 1987). Reprinted with permission.

not influence the computed risk ages, but allowed the user to generate a more concise one page health risk appraisal (HRA) report to be used for health education purposes (Figure 3). Recommendations and referrals for employees with increased blood cholesterol levels were based on a summary of the NIH National Cholesterol Education Program for High Blood Cholesterol in Adults (Figure 4).

Two weeks after the employees completed their health assessment visit, they had a one on one consultation with a nurse and/or physician to review their health assessment data and HRA. This consultation provided an excellent opportunity to explain thoroughly the health risk appraisal report, answer any questions, and register employees for risk reduction interventions. Appropriate referrals and follow up appointments

were scheduled at this time.

Cholesterol Treatment Program

The cholesterol treatment program was developed by the coordinator of the NIH Coronary Primary Prevention Trial and the NIH National Cholesterol Education Program (Goor, 1987). The co-developer is a writer with extensive culinary skills. The heart healthy recipes are the result of over 15 years of adapting, creating, and testing menus.

The cholesterol treatment program is based on the NCEP guidelines and diet modifications recommended by the American Heart Association. It focuses on the saturated fat content of foods while maintaining a nutritionally adequate eating pattern.

Key features of the program include:

1. Eight 1 hour sessions of instruc-

CARDIOVASCULAR RISK REDUCTION PROGRAM HEALTH RISK APPRAISAL REPORT

Chronological Age: 30

Present Risk Age: 27

Target Risk Age: 27

The health risk appraisal is an education tool based on a computer model developed by the Carter Center of Emory University. It shows you the choices that you can make to remain healthy and to reduce your chances of dying from heart disease during the next 10 years for a person of your age and sex. The health risk appraisal is not a substitute for a check up or physical exam that may be performed by a health professional. It is also not designed for people who already have heart disease or other serious conditions.

Name: John Test
SSN: 444-44-4444

Sex: Male

Frame Size: Medium
Height: 6' 0"

Risk Factor	Previous Results 7/87	Current Results 8/88	Optimal Levels
Blood Pressure			
Systolic BP	123	120	Below 140 mm Hg
Diastolic BP	82	80	Below 90 mm Hg
Blood Cholesterol			
Total	174	170	Below 200 mm Hg
LDL	110	100	Below 130 mm Hg
HDL	59	55	Above 54 mm Hg
Glucose	95	90	Below 130 mm/dL
Body Weight	162	195	148-154 lbs
Smoking Habits	0/day	0/day	None
Aerobic Exercise	2/week	2/week	>2 days/week

Good Habits

Optimal blood pressure
Desirable cholesterol level
Optimal blood glucose
Non-smoker

Habits You Could Change

Decrease body weight
Increase aerobic exercise

Recommendations and Referrals

- Reschedule appointment with health services within ___ weeks for _____.
- See private health care provider within ___ weeks for _____.
- Reduce body weight; consider joining a weight management class.
- Increase aerobic activity; consult your health care provider about starting aerobic exercise activities.

The above results have been reviewed with me by a nurse or physician, and I have been given the opportunity to ask questions about the results of my health risk appraisal. I understand that the health risk appraisal does not guarantee that I will live longer, but offers suggestions that may increase my chances for a longer, healthier life.

Employee Signature _____

Date _____

Health Educator Signature _____

Date _____

Figure 3: Health risk appraisal report utilized as a health education tool.

**From the National Institutes of Health
Adult* Treatment Guidelines
National Cholesterol Education Program**

Criteria	Action
If total blood cholesterol <200	Repeat total blood cholesterol in 5 years or at physical exam; recommend general diet
If total blood cholesterol 200-239 and No CHD and <2 risk factors † CHD present or ≥2 risk factors	Repeat total blood cholesterol annually; Step 1 diet Determine LDL
If total blood cholesterol ≥240	
If LDL <130	Repeat total blood cholesterol in 5 years; Recommend general diet
If LDL 130-159 and No CHD and <2 risk factors CHD present or ≥2 risk factors	Repeat total blood cholesterol annually; Step 1 diet Clinical evaluation; Step 1 or 2 diet Diet goals: LDL <160 or LDL <130 if CHD present or ≥2 risk factors
If LDL ≥160	
Continue Dietary Treatment for 6 Months. If Goals Not Met, Consider Drug Treatment	

† Risk Factors for Coronary Heart Diseases (CHD)

- Male sex
- Cigarette smoking
- HDL <35 mg/dL
- Cerebrovascular disease or occlusive PVD
- Family history
- Hypertension
- Diabetes mellitus
- Severe obesity

Dietary Treatment

	Step 1 Diet	Step 2 Diet
Saturated fat	<10% of calories	<7% of calories
Dietary cholesterol	<300 mg/day	<200 mg/day

* Guidelines apply to all adults over age 19.

Figure 4: Guidelines for recommendations and referrals of employees. Source: Health Prospects, Rockville, MD, based on October 5, 1987 report of the National Cholesterol Education Program. Reprinted with permission.

- tion and counseling by a registered dietitian.
2. Three 1 hour follow up sessions with a registered dietitian over a 12 month period.
3. Baseline lipoprotein analysis (total cholesterol, LDL, HDL) and three redraws prior to follow up sessions.
4. Encouragement of spouse participation.
5. Calculation of saturated fat budget with weekly food intake.
6. Individualized heart healthy eating tips and guidelines.
7. Practical information on how to deal with nutrition at home, at work, and on the go.
8. Up to date information on cholesterol and heart disease and new food products.
9. Informative and practical take

home materials, including a book, a slide guide to estimate saturated fat calories from food labels, a 50-page workbook, and a passbook to monitor saturated fat intake.

10. Information on how to order heart healthy food in restaurants, with role playing in practice situations.

The program was offered to employees and their spouses from 11:30 a.m. to 12:30 p.m. and 12:00 to 1:00 p.m. The class was limited to 10 participants. The instructors were chosen from a pool of registered dietitians who had completed the instructor certification for the program. A 1 day workshop, "Cholesterol as a Risk Factor," was provided for nurses and physicians in the occupational health services by the author

of the program.

Evaluation of the cholesterol treatment program was conducted on two levels: process evaluation and impact evaluation. Process evaluation focused on: program quality, participant satisfaction, suggestions for program improvement, degree of involvement among participants, and the characteristics of class participants and non-participants. Impact evaluation concentrated on measuring the change in risk related behaviors (Figure 5).

Supportive Environment for Lifestyle Changes

Management's commitment to provide a supportive environment for lifestyle changes included funding for:

1. A heart healthy restaurant project.

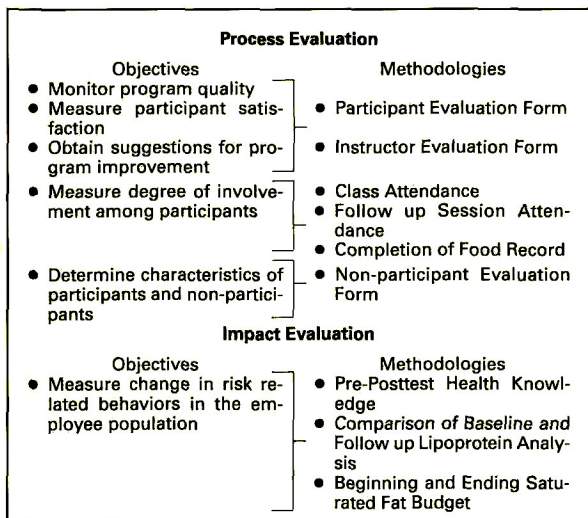



Figure 5: Program evaluation of a cholesterol treatment program. The objectives and methodologies utilized to facilitate process and impact evaluation.



Sweet and Sour Chicken
3 1/2 oz.

CALORIES: 284
TOTAL FAT: 4gm = FAT CALORIES 36
SATURATED FAT: 1gm = SATURATED FAT CALORIES 9
CHOLESTEROL: 73 mg
SODIUM: 86 mg

Figure 6: Heart healthy restaurant project display cards with nutritional information on heart healthy food choices.

2. Company time and cost sharing for the program.
3. Monthly health newsletter.
4. Walk-jog trail.

Because one out of the three meals is eaten away from home, the work environment offers an excellent opportunity to encourage healthy eating patterns and provide nutritional food choices. The heart healthy restaurant project was designed to help employees choose foods consistent

with the guidelines from the American Heart Association and the National Cholesterol Education Program.

The heart healthy restaurant project was designed and implemented by a master's prepared nurse consultant and a master's prepared registered dietitian (American Heart Association, 1984). Visits were made early in the design stage to several major corporations with low fat/low

cholesterol restaurant programs.

The purposes of the heart healthy restaurant project were to:

1. Provide a supportive environment for employees striving to make nutritional lifestyle changes for lowering blood cholesterol, reducing weight, and controlling blood pressure.
2. Provide nutritional information for all employees, enabling them to make an educated choice.

Choice was the key concept. Heart healthy food items offered daily included an entree, hot side dish, cold salad, soup, sandwich, salad bar with dressings, snacks, dessert, bread, fresh fruit, condiments, and breakfast items. The rest of the menu remained unchanged, with absolute freedom of choice for the consumer.

Nutritional information was displayed on cards in close proximity to all heart healthy food items: name of item, portion size, calories, total fat, saturated fat, cholesterol, and sodium (Figure 6). Heart healthy food items were identified with a red heart on the menu board and in the *Menu of the Week* publication. Heart healthy food items were available also through the carry out and catering services.

Services provided by the registered dietitian laid a sound foundation for introducing the heart healthy restaurant project:

- Education for food service managers and personnel.
 - Recipe analysis and modification.
 - Quality control on food preparation and portion size.
 - Quality assurance; any food which received the "heart healthy" approval actually met the standards set.
 - Being present opening day for staff reassurance and to answer questions.
 - Retraining food service personnel with staff turnover.
- The marketing campaign which began 1 month prior to opening day included:
- "Coming Attractions" poster—1 month ahead.
 - Introductory poster—3 weeks ahead.

Heart Healthy Food Choices Offered

Beginning September 12th, the Restaurant Service will offer and identify food choices that are heart healthy. This is provided as a part of a supportive environment for employees striving to make nutritional choices for weight reduction, blood pressure control, and for lowering blood cholesterol—and for all employees to make nutritionally sound food selections.

Display cards with the Heart Healthy logo will be in close proximity to these items: one hot entree, two hot side dishes, two cold salads, and selected sandwiches. The cards will contain the following information:

- Portion size
- Calories
- Total fat
- Saturated fat
- Cholesterol
- Sodium

The Heart Healthy food choices are based on the recommendations of the American Heart Association Nutrition Committee and the National Cholesterol Education Program.

Foods such as fruit, skim milk, frozen yogurt, bagels, cereals, and some salad bar and condiment items that are offered daily will also display the Heart Healthy logo and nutritional information. Heart healthy food choices will be identified with a red heart on the menu board and in the *Menu of the Week* publication. Heart healthy choices also will be offered through the carry out and catering services.

Figure 7: Heart healthy restaurant project table tent information.

- Introductory article published in health newsletter.
- Introductory handout—2 weeks ahead.
- Announcement published in in-house newsletter—1 week ahead.
- Table tents (Figure 7) and balloons—opening day.

The heart healthy restaurant project and the cholesterol treatment program classes began simultaneously to aid participant completion of weekly food records. Guest speakers, informational pamphlets, cookbooks, and specialty food items were available during these promotional activities: February, American Heart Month; May, National Blood Pressure Month; July, Outdoor Grilling; November, National Diabetes Month; December, Holiday Dining. Additional half hour lunch periods were granted to employees in the cholesterol treatment classes. The company paid half the total fee per employee and/or spouse.

During the pilot program the health newsletter was published as usual on a monthly basis. This newsletter, edited by an in-house nurse, covers a broad range of health issues and provides a medium for announcing future events

of the CVRRP.

SUMMARY

The model presented for cholesterol reduction described a baseline health assessment education which included individual HRA consultation with a health professional, an 8 week cholesterol treatment program, a supportive environment provided by a heart healthy restaurant, administrative leave, cost sharing for cholesterol treatment program classes, and follow up and remeasurement of cholesterol levels.

Results from the initial classes show the effectiveness of the cholesterol treatment program. Initial total blood cholesterol levels ranged from 200 to 275 mg/dL, with an average of 241 mg/dL. During the 8 weeks of the program, blood cholesterol levels decreased by 16% to an average of 202 mg/dL.

Participant course completion was 70% for those individuals who registered for the cholesterol treatment program classes. Work related travel and other time commitments were the primary reasons for course non-completion. Sixty-seven percent of those not completing the course rescheduled for a subsequent class.

In the evaluation, the variety of food choices, the resulting weight reduction, and the end result of lowered cholesterol ranked high. The weekly food records were ranked low by the majority of participants, yet all felt completing the food records provided insight necessary for successfully lowering their total blood cholesterol levels.

Course instructors and course participants recommended condensing the program format into six 1 hour sessions and continuing the three 1 hour follow up sessions. Feedback provided a basis for modifying course format and times at which the classes were offered.

Program costs for the cholesterol reduction component of the CVRRP included three additional fasting blood chemistries, educational pamphlets, administrative leave, and instructor and course fees. The total cost for the cholesterol treatment program per employee or per employee and spouse was \$80 and \$125, respectively. Company cost sharing reduced these participant fees to \$40 and \$62.50, respectively.

Costs for the heart healthy restaurant project included program development by a registered nurse; recipe

analysis, quality control, and training for food service personnel by a registered dietitian; clinical support; and graphics, supplies, and promotional materials. Depending on the restaurant vendor and outside resources, all programs may not incur all these costs.

Uncontrolled cardiovascular risk factors in an employee population represents a serious and costly health problem. The occupational health nurse is in a key position to identify employees at risk, provide education, make appropriate referrals, and

facilitate long term lifestyle changes through tracking and follow up. The workplace provides an excellent opportunity for corporations to improve and maintain the health of their most valuable asset: human resources.

REFERENCES

American Heart Association. (1984). Cafeteria nutrition project. *Registered Dietitian Manual*. Dallas, TX: Author.
American Heart Association. (1988). *Dietary guidelines for healthy American adults: A statement for physicians and health professionals by the nutrition committee*. Dallas, TX: Author.
American Heart Association. (1988). *Heart*

facts. New York: Author.
Goor, R., & Goor, N. (1987). *Eater's Choice: A food lover's guide to lower cholesterol*. Boston, MA: Houghton Mifflin.
LaRosa, J. (1986). Cholesterol and smoking education programs: Application to the workplace. *AAOHN Journal*, 34(7), 326-332.
LaRosa, J., & Haines, C. (1986). *A guide to heart and lung health at the workplace*. Bethesda, MD: National Institutes of Health (Publication No. 86-2210).
LaRosa, J., Becker, D., & Fitzgerald, S. (1990). Elevated blood cholesterol: A risk factor for coronary heart disease. *AAOHN Journal*, 38(5), 211-215.
Lenfant, C. (1988). *National cholesterol education program. Report of the expert panel on detection, evaluation and treatment of high blood cholesterol in adults*. Bethesda, MD: National Institutes of Health (NIH publication No. 88-2925).
Lenfant, C. (1990). The cholesterol facts (editorial). *AAOHN Journal*, 38(5), 209-210.
Lipid research clinics program. (1984). The Lipid Research Clinics/Coronary Primary Prevention Trial Results, II: The relationship of reduction in incidence of coronary heart disease to cholesterol lowering. *JAMA*, 251(3), 365-374.
National Institutes of Health. (1987). *Facts about...blood cholesterol*. Bethesda, MD: Author (Publication No. 88-2696).
O'Donnell, P., & Ainsworth, T. (1984). *Health promotion in the workplace*. New York: John Wiley & Sons.
Ostwald, S. (1986). Cost-benefit analysis: A framework for evaluating corporate health promotion programs. *AAOHN Journal*, 34(8), 377-382.
Schron, E. (1985). Cardiovascular risk factor reduction in the workplace: Why and how? *Occupational Health Nursing*, 33, 229-233.

**Cholesterol Reduction
IN SUMMARY**

A Model for Cholesterol Reduction in a Corporate Research Setting. Haselhorst, B. AAOHN Journal 1991; 39(5):241-248.

1. Cardiovascular risk reduction programs at the worksite may be effective in reducing the incidence of coronary heart disease due to elevated blood cholesterol levels in the employee population.
2. Employers have a vested interest to provide a work environment conducive to lowering an individual's risk of coronary heart disease. CHD translates into a multitude of costs for both employers and employees.
3. The worksite can provide an excellent opportunity for a corporation to improve and maintain the health of human resources, their most valuable asset.
4. Occupational health nurses are in a key position to identify employees at risk, provide education, make appropriate referrals, and facilitate long term lifestyle changes through tracking and follow up.

ABOUT THE AUTHOR: Ms. Haselhorst is an Occupational Health Consultant, Public Health Service/Federal Occupational Health, St. Louis, MO.