

ADHERENCE TO HYPERCHOLESTEROLEMIA MANAGEMENT GUIDELINES  
BY HEALTH CARE PROVIDERS IN A UNITED STATES AIR FORCE MEDICAL  
TREATMENT FACILITY

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## ABSTRACT

Building a healthy community is the goal of Healthy People 2000 and Healthy People 2010, and is also one of the U.S. Air Force Medical Service priorities. Periodic cholesterol screening and lifestyle modification can prevent the suffering from coronary heart disease, save lives, minimize financial burden, and effectively utilize the limited resources. The purpose of this study was to describe the adherence to the National Cholesterol Education Program (NCEP) guidelines pertaining to cholesterol screening and the use of lifestyle modification management for treating high cholesterol in adults without evidence of coronary heart disease by health care providers in a United States Air Force medical treatment facility. The researcher conducted a retrospective medical record review using a checklist to describe health care providers' adherence to the NCEP guidelines on cholesterol screening in adults without evidence of coronary heart disease. And the checklist was developed by following the NCEP cholesterol management algorithm. A pilot study was conducted and intra-rater reliability of 0.9 was determined. A total of 100 records meeting inclusion criteria were reviewed. Results showed that the cholesterol screening rate was 75% and the compliance rate of providing lifestyle modification counseling to clients with elevated cholesterol level was 58% to 64% which were higher than the findings of other studies. There were 23 current smokers, and 18 of them received smoking cessation counseling which was also higher than the findings of other studies. However, the rate of providing follow-up instruction was poor, only 18% of clients received specific follow-up instruction.

Key words: **hypercholesterolemia**   **high cholesterol**   **adherence to guidelines**  
**cholesterol screening**   **lifestyle modification**

ADHERENCE TO HYPERCHOLESTEROLEMIA MANAGEMENT GUIDELINES  
BY HEALTH CARE PROVIDERS IN A UNITED STATES AIR FORCE  
MEDICAL TREATMENT FACILITY

by

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## PREFACE

This research was conducted to provide information on the preventive activities toward cardiovascular disease in a United States Air Force medical treatment facility. It was designed to support the nurse practitioner's role on health promotion and disease prevention.

## DEDICATION

I dedicate the successful completion of this thesis to my family, faculty, and fellow classmates, who all provided the encouragement and support that made the successful completion of this thesis possible.

To my husband Ping-Ho, and my daughters LeeAnn and Elizabeth, thank you for all your love and support. Without your assistance and understanding, I never would have been able to accomplish this seemingly impossible task.

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## TABLE OF CONTENTS

PREFACE.....	viii
DEDICATION.....	ix
ACKNOWLEDGEMENT.....	x
TABLE OF CONTENTS.....	xi
LIST OF TABLES.....	xiv
CHAPTER I: INTRODUCTION.....	1
Background.....	1
Purpose of Study.....	4
The Research Question.....	6
Theoretical Framework.....	8
Conceptual and Operational Definition.....	10
Assumptions and Limitations.....	13
Summary.....	14
CHAPTER II: REVIEW OF LITERATURE.....	15
Introduction.....	15
Effects of Lifestyle Modification.....	15
Adherence to NCEP Guidelines.....	17
Related Clinical Preventive Studies.....	20
Summary.....	22
CHAPTER III: METHODOLOGY.....	23
Research Design.....	23
Sampling and Setting.....	23

Procedure.....	24
Reliability.....	25
Protection of Human Rights.....	26
Data Analysis.....	26
Summary.....	27
CHAPTER IV: FINDINGS OF THE STUDY.....	28
The Sample.....	28
Adherence to NCEP Guidelines.....	30
Adherence to Recommended Screening frequency.....	30
Adherence to Lifestyle Modification and Follow-Up Instructions for Patients Whose Total Cholesterol Was 200 - 239 mg/dL.....	32
Adherence to Lifestyle Modification and Follow-Up Instructions for Patients Whose Total Cholesterol Was Equal to or Greater Than 240 mg/dL.....	36
CHD Risk Factor Reduction.....	38
Follow-Up Instruction.....	39
Summary.....	40
CHAPTER V: CONCLUSIONS AND RECOMMENDATIONS.....	42
Introduction.....	42
Conclusion.....	43
Recommendations for Education.....	45
Recommendations for practice.....	46
Recommendations for Future Study.....	47
Summary.....	48

REFERENCES.....	49
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APPENDICES.....	53
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APPENDIX A: Primary prevention in Adults without Evidence of CHD: Initial  
Classification Based on Total Cholesterol and HDL-Cholesterol

APPENDIX B: Medical Record Review Checklist

APPENDIX C: IRB Approval

APPENDIX D: Institution Approval for Data Collection

## LIST OF TABLES

Table 1. Demographic Characteristics of the sample.....	29
Table 2. Total Cholesterol Screening Rate.....	31
Table 3. Total Cholesterol Level Distribution.....	32
Table 4. Lifestyle Modification Instructions Provided to People with Total Cholesterol 200 - 239 mg/dL.....	34
Table 5. Lifestyle Modification Instructions Provided to People with Total Cholesterol Equal to or Greater Than 240 mg/dL.....	37
Table 6. Lifestyle Modification Instructions to People in Combined Group.....	38

## CHAPTER I: INTRODUCTION

### Background

Cholesterol, a necessary component for a healthy body, is found among the fats in the blood stream and in all human body cells. It is used to form cell membranes, some hormones and other needed tissues. An elevated level of blood cholesterol known as hypercholesterolemia will cause abnormal thickening, hardening, and narrowing of arteries that can lead to or worsen a pathophysiologic condition known as atherosclerosis that leads to such disorders as high blood pressure, heart attack, or stroke (American Heart Association, 1998; Brashers, Haak, & Richardson, 1998).

Because of its connection with atherosclerotic changes, hypercholesterolemia has been associated with significant morbidity and mortality. From 1985 to 1995 the mortality rate from heart attack in the United States declined 28.7%, but coronary heart disease (CHD) remains the single leading cause of death in America today causing more than 480,000 deaths in 1995. In addition, there are more than thirteen million people that currently suffer from CHD. An estimated one million Americans will have a new or recurrent heart attack in 1999 and about one third of them will die (American Heart Association, 1998). Besides the high morbidity and mortality, heart disease is also a financial burden to society. The American Heart Association (AHA) estimated that in 1998, two hundred and fifty nine billion dollars were lost in direct medical costs and lost productivity resulting from cardiovascular disease. Cholesterol screening and early management of hypercholesterolemia to prevent CHD is therefore very important and is a challenge to health care providers (American Heart Association, 1998).

Cholesterol and other fats cannot dissolve in the blood, so they need special

carriers to transport them from cell to cell. Those special carriers are made of lipids and proteins called lipoproteins. There are several kinds of lipoproteins, but low-density lipoprotein (LDL) and high-density lipoprotein (HDL) are the most relevant when discussing CHD prevention and management. Low-density lipoprotein (LDL) is the main cholesterol carrier in the blood. When there is too much LDL-cholesterol circulating in the blood, together with other substances it can form plaque, a thick, hard deposit that can clog arteries, especially arteries feeding the heart and brain. This process is called atherosclerosis. For this reason, a high level of LDL-cholesterol reflects an increased risk of heart disease and stroke (American Heart Association, 1998; Brashers et al., 1998).

About one-third to one-fourth of blood cholesterol is carried by HDLs that bring excess cholesterol away from the arteries to the liver where it can be metabolized. HDLs are thought to prevent or delay atherogenesis and are believed to be protective. Low levels of HDL have been shown to be a risk for CHD, even if total cholesterol levels are normal (American Heart Association, 1998; Brashers et al., 1998).

There are three strategies for fighting CHD. Primary prevention of CHD includes giving guidance to people without known CHD. The goal is to prevent the development of preventable risk factors. Secondary prevention is meant to reduce the risk factors and prevent the damage to the target organs. Tertiary prevention treats the disease and prevents further damage to the heart. The American Heart Association and National Cholesterol Education Program (NCEP) of the National Heart, Lung, and Blood Institute list several risk factors for CHD: increased LDL-cholesterol, age, family history of premature CHD, cigarette smoking, hypertension, low HDL-cholesterol and diabetes mellitus (National Cholesterol Educational Program, 1994; Office of Disease Prevention

and Health Promotion [ODPHP], 1998). Many of these risk factors can be prevented by lifestyle modification. Throughout this study each reference to NCEP refers to the 1994 publication.

The Second Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment II, or ATP II) identifies LDL as the primary target of cholesterol-lowering therapy and emphasizes its importance in primary prevention of CHD. Dietary therapy is recommended as the first line of treatment of high blood cholesterol, and drug therapy is reserved for patients considered at high risk for CHD (National Cholesterol Educational Program, 1994).

NCEP recommends a two-step dietary approach to reduce blood concentrations of total cholesterol and LDL-cholesterol. Studies have shown that both step I and step II diet modifications decrease either total cholesterol or LDL-cholesterol level in varying degrees (Caggula et al., 1996; Schaefer et al., 1997). A 12-year follow-up study focusing on the association of body fat and lipoprotein profile revealed significant associations between changes in body fat mass and plasma cholesterol in women. This study also demonstrated that in both men and women, an increased body fat mass was associated with an increased cholesterol and HDL-cholesterol ratio (Couillard et al., 1996).

According to ATP II (NCEP, 1994), many clinical trials demonstrate conclusively that lowering serum cholesterol will decrease new CHD events and CHD mortality in people without evidence of CHD, and also decrease morbidity and mortality from CHD among patients with established CHD. Despite these salutary findings, cost effective cholesterol-lowering therapy, both non-pharmacological and pharmacological, is still markedly underutilized in CHD patients and in high-risk asymptomatic population

(Amsterdam & Deedwania, 1998). For example, Pearson, McBride, Miller and Smith (1996) reported only 45% to 65% of patients with hypercholesterolemia had evidence of treatment, and only 40% to 55% of smokers received physician's advice on smoking cessation while 75% of smokers said they would attempt to stop smoking if their physicians advised them to do so.

### Purpose of the Study

The purpose of this study was to describe the adherence to the National Cholesterol Education Program (NCEP, 1994) guidelines pertaining to cholesterol screening and the use of lifestyle modification management for treating high cholesterol in adults without evidence of coronary heart disease by health care providers in a United States Air Force medical treatment facility.

In order to prevent suffering from CHD, save lives, minimize financial burden, and effectively utilize the limited resources, prevention is the best solution. Slight variation exists among professional organizations regarding cholesterol screening guidelines. The major difference among these guidelines is at what age to start and to stop the screening in asymptomatic adults. The National Cholesterol Education Program (1994) recommends adults 20 years of age and older should have a total cholesterol check at least once every five years; and HDL-cholesterol should be measured at the same time if accurate results are available (ODPHP, 1998).

Other organizations, such as the American Academy of Family Physicians (AAFP) and the American College of Physicians (ACP) recommend only men aged 35 to 65 and women aged 45 to 65 years be screened periodically for cholesterol levels. The American Heart Association stands by the NCEP guidelines, which have been reviewed and



endorsed by representatives of more than 40 professional organizations including AAFP and ACP (ODPHP, 1998).

Besides measuring the total blood cholesterol and HDL-cholesterol, health care providers should also assess individuals' other non-lipid CHD risk factors.

Atherosclerosis is a slow ongoing lifelong process; hence lifestyle modification plays a very important role in CHD prevention. Finding a high cholesterol level in young adulthood can serve as a motivator to the individual to improve personal patterns of diet, physical activity, and weight control. It also enables the health care providers to counsel the patients about lifestyle changes. Waiting until mid-life to treat people with a high cholesterol level will not confer all the benefits that could have been realized if the lifestyle had been changed earlier in life. AAFA and ACP guidelines not only overlook evidence that cholesterol levels in young adults predict mid-life CHD, but also neglect to recognize that cholesterol lowering is just as effective in persons older than 65 years as it is in younger persons (Task Force on Risk Reduction, 1996).

Building a healthy community is the goal of Healthy People 2000 (Department of Health and Human Services [DHHS], 1991) and Healthy People 2010 (DHHS, 2000), and is also one of the U.S. Air Force Medical Service priorities. That means the health care profession needs to change the focus from treating diseases to prevention of the development of diseases. The Put Prevention Into Practice (ODPHP, 1998) initiative is a way to achieve the goal of building a healthy community. This is an effort to encourage all health care providers to incorporate prevention into their routine practice. The goal is to have health care providers track key health indicators like cholesterol levels or other health risk factors during each patient visit and promote lifestyle changes (True, 1998).

The preventive health assessment implementation plan prepared by the Headquarters Air Force Medical Operations Agency (1997) includes the initial screening of the new recruits and the ongoing prevention based screening, the schedule for cholesterol is consistent with the NCEP guidelines. This means checking cholesterol level every 5 years beginning at the age of 20. It is for this reason that the NCEP guidelines for cholesterol screening of adults without evidence of CHD will be used in this study.

Health care providers have the professional, legal, and ethical responsibility to treat patients based on the most current professional guidelines to promote health and modify risk factors that lead to disease. The purpose of this study is to describe the use of the NCEP guidelines for prevention of CHD by health care providers in a United States Air Force (USAF) medical treatment facility. More specifically, this study will assess health care providers adherence to the NCEP guidelines pertaining to cholesterol screening and the use of lifestyle modification management for treating high cholesterol in adults without evidence of CHD.

### The Research Question

To what extent do health care providers in a USAF medical treatment facility (MTF) adhere to the NCEP guidelines (see Appendix A) for treatment of hypercholesterolemia in adults without evidence of CHD as documented in adult patients' medical records? In order to answer this question, the following research questions were studied:

1. To what extent do all adult patients 25 years of age and older have their cholesterol levels checked at least once in the past five years?
2. To what extent do health care providers provide dietary modification

instruction to patients whose total blood cholesterol is 200-239

mg/dL (borderline hypercholesterolemia), HDL-cholesterol is equal to or

greater than 35 mg/dL, and has fewer than two other CHD risk factors?

3. To what extent do health care providers provide instruction regarding exercise to patients whose total blood cholesterol is 200-239 mg/dL, HDL-cholesterol is equal to or greater than 35 mg/dL, and has fewer than two other CHD risk factors?
4. To what extent do health care providers provide instruction on CHD risk factor reduction other than hypercholesterolemia to patients whose total blood cholesterol is 200-239 mg/dL, HDL-cholesterol is equal to or greater than 35 mg/dL, and has fewer than two other CHD risk factor?
5. To what extent do health care providers provide dietary modification instruction to patients whose total blood cholesterol is 200-239 mg/dL (borderline hypercholesterolemia), but HDL-cholesterol is less than 35 mg/dL or who has two or more than two other CHD risk factors?
6. To what extent do health care providers provide instruction regarding exercise to patients whose total blood cholesterol is 200-239 mg/dL, but HDL-cholesterol is less than 35 mg/dL or who has two or more than two other CHD risk factors?
7. To what extent do health care providers provide instruction on CHD risk factor reduction other than hypercholesterolemia to patients whose total blood cholesterol is 200-239 mg/dL, but HDL-cholesterol is less than 35 mg/dL or who has two or more risk factors?

8. To what extent do health care providers provide dietary modification instruction to patients whose blood total cholesterol is equal to or greater than 240 mg/dL?
9. To what extent do health care providers provide instruction regarding exercise to patients whose total blood cholesterol is equal to or greater than 240 mg/dL?
10. To what extent do health care providers provide instruction on CHD risk factor reduction other than hypercholesterolemia to patients whose total blood cholesterol is equal to or greater than 240 mg/dL?
11. What instructions for follow-up care do health care providers give patients with elevated total blood cholesterol regarding repeating total cholesterol and HDL-cholesterol measurement?

#### Theoretical Framework

Based on Neuman Systems Model (Reed, 1995), the client system is a series of concentric circles surrounding a core basic structure. Each circle is a different line of defense or resistance and its main function is to protect the basic structure and help maintain the system in a stable state. Neuman identified five variables: physiological, psychological, sociocultural, developmental, and spiritual variables. The interrelationship of these variables can affect the degree of protection of client's lines of defense or resistance against known and unknown environmental stressors. The environment is defined as the forces surrounding the man both internal and external, and the environmental stressors may have a positive or negative influence on the client. Neuman views health or wellness as the state of harmony between the variables and the

environment.

In Neuman Systems Model (Reed, 1995), the client has three lines of defense, a flexible line of defense, a normal line of defense, and a line of resistance. An individual's normal line of defense is a condition of relative stability developed over time for this person. In other words, the normal line of defense defines the parameters of the state of health or is referred to as an individual's equilibrium. The individual also has developed an expanded line of defense to protect the normal line called the flexible line of defense. The flexible line of defense is the individual's first line of protection against stressors so that they would not break through to the normal line. In case the flexible line of defense has failed to protect or support the normal line or usual stability state, the individual also has an internal line of resistance that will attempt to stabilize the person or bring back the balance following a reaction to stressor invasion.

There are also three types of prevention against environmental stressors in Neuman's Model: primary, secondary, and tertiary prevention (Reed, 1995). These three levels of prevention are used to attain, maintain, and retain wellness. Primary prevention aims at protecting the normal line of defense by expanding the flexible line of defense ability to overcome environmental stressors and decreasing risk factors. Secondary prevention aims at strengthening the system's lines of resistance and protecting the basic structure when the normal line of defense is destroyed and results in the client's symptoms. Tertiary prevention refers to helping the client regain or return to a wellness state after treatment, then re-adapt and maintain the new stability.

For the purpose of this study, the Neuman Systems Model (Reed, 1995) is used to describe the effects of cholesterol screening in adults without evidence of CHD. The

desirable cholesterol level is total blood cholesterol less than 200 mg/dL with HDL-cholesterol equal to or greater than 35 mg/dL. This is the client's expanded flexible line of defense. Total blood cholesterol at 200-239 mg/dL with HDL-cholesterol equal to or greater than 35 mg/dL is the contracted flexible line of defense. When total blood cholesterol is equal to or greater than 240 mg/dL or HDL-cholesterol is less than 35 mg/dL, the buffer effect of the flexible line of defense is very contracted or disrupted and goes into normal line of defense. Normal line of defense is the client's baseline functioning. If there is no intervention to reduce the blood cholesterol, eventually the fat deposits inside the arteries of heart and brain will clog and cause CHD or stroke. Internal stressors influencing the baseline functioning include patterns of health behaviors and lifestyle, and external factors can be cultural influences and cholesterol-lowering agents. The teaching provided by health care providers for lifestyle changes such as low cholesterol diet, increasing physical activities, and smoking cessation will reduce the risk factors for CHD and strengthen or rebuild the flexible line of defense (NCEP, 1994).

The goal in prevention is to decrease risk factors through behavior modification, minimize the insults to the individual's body, prevent disease, promote wellness and build a healthy community. Therefore, the interest of this study was in secondary prevention. This study examined the adherence to the NCEP guidelines by health care providers in a United States Air Force (USAF) medical treatment facility when patients have elevated total blood cholesterol.

#### Conceptual and Operational Definition

For the purpose of this study, the conceptual and operational definitions of some key terms were addressed.

### Cholesterol

Cholesterol is a very important lipid, which is the precursor of bile acids and steroid hormones and a key constituent of cell membranes. Most of it is synthesized by the liver and other tissues, but some is absorbed from dietary sources. Cholesterol is transported in the plasma by specific lipoproteins (Brashers et al., 1998). The operational definition of cholesterol in this study is the cholesterol value recorded on the laboratory report in the individual's medical record. The desirable total blood cholesterol level is less than 200 mg/dL (ODPHP, 1998).

### Hypercholesterolemia

Hypercholesterolemia means an elevated level of blood cholesterol, which contributes to the abnormal thickening and hardening of the blood vessel walls. The process of thickening and hardening of vessel walls called atherosclerosis is a major risk factor for CHD (Brashers et al., 1998). In this study, it means the total blood cholesterol level is equal to or greater than 200 mg/dL that needs cholesterol-lowering therapy (ODPHP, 1998). If the total cholesterol is between 200 mg/dL and 239 mg/dL, it is referred to as borderline hypercholesterolemia. If the total cholesterol is equal to or greater than 240 mg/dL, it is referred to as diagnosed hypercholesterolemia.

### High Density Lipoprotein

High density lipoprotein contains relatively little lipid and much protein. It is the smallest and densest lipoprotein particle in the human body. HDL particles are initially made in a nascent form in the liver; they take up and transport free cholesterol from the periphery to the liver. HDL is thought to prevent or delay atherogenesis (American Heart Association, 1998; Chipkin, 1996). In this study, HDL is referred to as the HDL-

cholesterol value recorded on the laboratory report in the individual's medical record.

The normal HDL-cholesterol level is equal to or greater than 35 mg/dL. If HDL-cholesterol level is equal to or greater than 60 mg/dL, it is considered as a negative risk factor (ODPHP, 1998).

### Low Density Lipoprotein

Low density lipoprotein is the major cholesterol carrier in the blood. When there is too much LDL-cholesterol in the blood, it will slowly deposit on the injured blood vessel walls, and together with other substances form plaques, resulting in atherosclerosis (American Heart Association, 1998; Chipkin, 1996). In this study, LDL is referred to as the LDL-cholesterol value recorded on the laboratory report in the individual's medical record. The desirable LDL-cholesterol level is less than 130 mg/dL. LDL-cholesterol is calculated as:  $(\text{LDL-cholesterol}) = (\text{total cholesterol}) - (\text{HDL-cholesterol}) - (1/5 \text{ triglycerides})$ . But if triglycerides exceed 400, this formula is not applicable. The low-density of lipoproteins (LDL) needs to be measured through centrifugation (Chipkin, 1996; NCEP, 1994).

### Risk Factors

Risk factors are the attributes that lead to target conditions. They may not cause the target condition but can help predict outcomes. In this study, according to NCEP (1994), the risk factors for CHD include high LDL-cholesterol, increased age (male is equal to or greater than 45 years, female is equal to or greater than 55 years or premature menopause without estrogen replacement therapy), family history of premature CHD – definite myocardial infarction or sudden death (father or first degree male relative less than 55 years, mother or first degree female relative less than 65 years), cigarette



smoking, hypertension (or on antihypertensive medication), low HDL-cholesterol, and diabetes mellitus. And HDL-cholesterol equal to or greater than 60 mg/dL is considered as a negative risk factor (ODPHP, 1998).

### Health Care Providers

Health care providers refer to licensed physicians, nurse practitioners, and physician assistants. In this study, USAF health care providers refer to the credentialed providers that include physicians, nurse practitioners, and physician assistants who work at an outpatient clinic in a USAF medical treatment facility.

### Assumptions and Limitations

The assumptions of this study were as follows:

1. The health care providers were aware of the NCEP guidelines on prevention in adults without evidence of CHD.
2. All test results, progress notes (Standard form 600), and consultation notes were maintained in the patients' medical records.
3. Health care providers documented the diet, physical exercise, and CHD risk reduction instructions/referrals on patient's record.

The limitations of this study include:

1. This study reviewed the most recent five years of documentation in the medical records, because the guidelines recommend screening cholesterol every five years.
2. This was a small sample from a designated site. The results may not be generalized to other medical treatment facilities.
3. This study only examined the adherence to the NCEP guidelines on early

detection in adults without CHD.

4. This study was limited to lifestyle management only. The pharmacological intervention was not included in this study.

### Summary

Building a healthy community is the goal of Healthy People 2000 (DHHS, 1991) and Healthy People 2010 (DHHS, 2000), and is also one of the U.S. Air Force Medical Service priorities. The Put Prevention Into Practice (ODPHP, 1998) initiative is a way to achieve the goal. In order to prevent the suffering from CHD, save lives, minimize financial burden, and effectively utilize the limited resources, prevention is the solution. Increased total cholesterol is one of the CHD risk factors. Following National Cholesterol Education Program (1994) guidelines screening client's cholesterol level, detecting the elevated level and treating it in early stage are the keys to prevent CHD. The purpose of this study was to describe the adherence to the NCEP guidelines pertaining to cholesterol screening and the use of lifestyle modification management for treating high cholesterol in adults without evidence of CHD by health care providers in a United States Air Force medical treatment facility.

## CHAPTER II: LITERATURE REVIEW

### Introduction

In this chapter, the evidence based benefits of non-pharmacological measures in hypercholesterolemia management and the studies regarding the adherence to the National Cholesterol Education Program (NCEP, 1994) guidelines on hypercholesterolemia management will be reviewed. In addition, the related preventive care studies will be addressed.

A meta-analysis conducted by Halperin et al. (1999) revealed that concentrations of total cholesterol and LDL-cholesterol are highly correlated with the development of coronary heart disease (CHD) and lowering blood lipid level has become the standard of practice for treating patients with established CHD and those at risk. Halperin et al. reported that three different clinical trials collectively observed more than 14,000 people on three different lipid-lowering drugs. These studies not only showed a reduction of 8% to 11% in total cholesterol level and a 10% to 26% reduction in LDL-cholesterol level, but also showed a 19% to 34% reduction in the incidence of CHD. Also, two of the three studies observed a 26% to 28% reduction in CHD mortality rate and a 21% to 37% reduction in coronary revascularization procedures. Despite the effective treatment in reduction cholesterol level and decreased CHD mortality rate, Halperin et al. learned that cholesterol screening and early intervention is still much under utilized. An estimated 50% of the population is unaware that they have elevated cholesterol levels and only 10% of those with hypercholesterolemia are aware, treated, and controlled.

### Effects of Lifestyle Modification

Besides the use of medications to lower cholesterol level, dietary therapy is also

aimed at reducing elevated blood cholesterol while maintaining a nutritionally adequate diet. The National Cholesterol Education Program (NCEP, 1994) recommends two steps—Step I and Step II dietary therapy. These are designed to progressively reduce intakes of saturated fat and cholesterol. The Step I diet involves an intake of saturated fat of 8% to 10% of total calories, equal or less than 30% of calories from total fat, and less than 300 mg of cholesterol per day. If this diet proves inadequate to achieve the goals of dietary therapy, the patient should proceed to the Step II diet. The Step II diet reduces further the saturated fat intake to less than 7% of calories and cholesterol to less than 200 mg per day. Studies have shown that both NCEP Step I and Step II diet modifications reduce cholesterol levels and the Step II diet modification may reduce LDL-cholesterol level as much as 15.6% for men and 18.9% for women. The effects of Step II diet modification are as good as some of the lipid-lowering drugs and have no side effects (Caggiula et al., 1996; Schaefer et al., 1997).

According to Halperin et al. (1999), numerous population-based, prospective, and cross-sectional studies over the past 50 years have shown that regular physical activity is strongly and inversely related to overall cardiovascular mortality and risk of CHD. A cohort study involving 24,341 men and 7,080 women conducted by Blair et al. (1996) demonstrated an inverse relationship not only between cardiorespiratory fitness and CHD mortality, but also all-cause mortality. Men in the lowest fitness group had a 1.7 relative risk of cardiovascular death compared with men in the highest fitness level. Women in the lowest fitness group had a relative risk of 2.42 compared with women in the highest fitness level. This study also found that highly fit people with multiple cardiac risk factors had a lower mortality rate than unfit people without risk factors.

Smoking is another important modifiable risk factor for coronary heart disease. A ten-year follow-up of CHD patients showed that smokers who quit smoking had longer survival, fewer hospitalizations, less angina, and less limitation of physical activity than patients who continued to smoke (Cavender et al., 1992). The meta-analysis of Halperin et al. (1999) also found that both men and women with excess risk of CHD caused by smoking was reduced by approximately 50% after one year of abstinence, and continued to decline gradually after the first year.

The Minnesota Heart Survey evaluated cardiovascular disease, risk, and health behavior among over 25,000 adults in the upper Midwest between 1980 and 1992 (Luepker, 1997). The researcher observed a significant decline of population blood cholesterol levels for both men and women. The researcher also found that the decline was largely due to the changes in diet during these years. The level of clinical detection of hypercholesterolemia via blood studies was less than 10% of the population in the early 1980s, and it rose to almost 20% in the last two years of the survey. But subjects receiving recommendations for dietary therapy declined from 50% of patients in 1982 to 32% in 1990. However, during the same period of time, recommendations to lose weight have risen; this may be considered a variant of dietary advice. In total, dietary advice including both dietary change and weight loss recommendations remained stable at approximately 50%.

#### Adherence to NCEP Guidelines

The NCEP (1994) has attempted to improve the public and health care providers' awareness of the importance of lipid screening and treatment by dissemination of educational materials and guidelines at a cost of 1.5 million dollars per year. In 1988, the

Adult Treatment Panel (ATP-I) guidelines emphasizing primary prevention were published and mailed to 150,000 physicians. In 1993, NCEP updated the guidelines (ATP-II) which emphasized secondary prevention and these updated guidelines were published in medical journal, Circulation, in March 1994.

Despite the benefits of screening and the use of non-pharmacologic measures in lowering cholesterol levels, there have been few studies on health care provider's use of these measures in a clinical setting. A study to assess cardiologists' approach to the treatment of hypercholesterolemia in a metropolitan teaching hospital was conducted by Cohen, Byrne, Levine, Gutowski, and Adelson (1991). Ninety five patients with chest pain were evaluated by coronary angiography in 1988-1989. Eighty one patients (85%) had obstructive coronary artery disease with at least a 50% luminal narrowing of one coronary artery. Although 85% of patients had angiographic evidence of CHD, only 15% of patients with total cholesterol equal to or greater than 200 mg/dL and 14% of patients with LDL-cholesterol equal to or greater than 130 mg/dL were being actively treated with diet and/or drugs as suggested by the NCEP (1994) guidelines. In the remaining patients (Cohen, Byrne, Levine, Gutowski, and Adelson, 1991), either lipid studies had not been done or abnormal results had not been addressed. Furthermore, there was little change in treatment approach during the month after the coronary angiography, even in those patients subjected to coronary revascularization. Sixty-nine patients of the original study group could be contacted again in one to two years after the initial intervention. While some active dietary or pharmacological therapy was initiated during this period, there were only 32.8% of hypercholesterolemic patients receiving active treatment. These patients were obviously under-treated for their lipid disorder, which suggested that the

published treatment guidelines had not been well acquainted or fully accepted by the health care providers.

A three-year chart audit of angina or myocardial infarction patients to determine the impact of the NCEP guidelines on cardiologists' screening and treatment rates was conducted by Meyers and Steinle (1997) at an urban hospital. In addition, the eight involved cardiologists were surveyed to assess their acquaintance with the NCEP (1994) guidelines and self-perceived change in attitudes toward lipid screening and therapy. There were 160 charts reviewed. In the 160 patients with CHD, total cholesterol levels were determined in 77% to 95% of patients, and lipid profiles were determined in 2% to 11% of patients. Frequencies of obtaining either test did not change across the surveyed years.

Among patients with total cholesterol determined, Meyers and Steinle (1997) found that 50% had levels above the NCEP treatment goal of 200 mg/dL. The data showed a two fold increase in diet modifying treatment from 33% in 1987 to 67% in 1994, but about two thirds of the 160 patients were not treated with either diet or drugs as recommended by the NCEP (1994) guidelines.

Meyers and Steinle (1997) found that the pattern of performance did not significantly improve across the surveyed years. The questionnaire survey suggested that all eight cardiologists were acquainted with NCEP (1988) ATP-I and six knew the ATP-II (NCEP, 1994) guidelines. Five cardiologists perceived themselves as currently more aggressive, two were unchanged, and one was less aggressive regarding lipids than in 1987.

There were two randomized studies in evaluating the efforts of improving the

compliance with NCEP (1988) (1988) ATP-1 guidelines. Headrick, Speroff, Pelecanes and Cabul (1992) compared three different approaches for improving the resident physicians compliance with NCEP guidelines in identifying and treating patients with high cholesterol levels. They found all three groups were similar in pre-intervention baseline compliance with NCEP recommendations, with an overall average baseline compliance of 30%. After the intervention, the compliance ranged from 41.8% to 50.6%.

Another study investigated the effects of continuing medical education on private practice physicians' compliance with NCEP (1994) guidelines. The results showed that there were no significant differences in screening cholesterol or compliance with guidelines between control group and experiment groups. The cholesterol screening rate was 51% - 57% and the compliance with NCEP guidelines was 33% - 37% (Browner, Baron, Solkowitz, Adler, & Gullion, 1994).

In a retrospective medical record review of 225 patients admitted to the coronary care unit of a university affiliated teaching hospital in 1996, Frolkis, Zyzanski, Schwartz, and Suhan (1998) found that the existence of documented CHD in nearly two thirds of the sample, but only 59% of them were screened for hyperlipidemia, four percent of smokers were counseled for smoking cessation, 14% of them were referred to dietitians, and one percent were encouraged to exercise.

#### Related Clinical Preventive Studies

There is little available published research regarding health care provider's adherence to NCEP (1994) guidelines in a primary care setting. However, there was a survey on the delivery of clinical preventive services by nurse practitioners (NPs) in primary care clinics in 1992. The survey revealed that 62% of the 892 participating NPs



reported that they routinely provided nutritional teaching; 44% of NPs provided physical exercise teaching; and 63% of NPs provided tobacco cessation teaching to clients in all age groups. It also revealed that 62% of NPs in adult settings (n=290) reported that they routinely provided cholesterol screening and 83% of them routinely provided blood pressure screening to all adults at regular intervals (Lemley, O'Grady, Rauckhorst, Russell, & Small, 1994).

It has been ten years since the NCEP guidelines were disseminated and mailed to the health care providers. Although there are some improvements on cholesterol screening and treatment over the years, many health care providers still have not broadened and intensified their cholesterol management. Several barriers to the compliance have been suggested, such as lack of time, lack of interest in risk factors, inadequate reimbursement, limited access to treatment resource, limited skills with diet and drug prescription, lack of confidence in diet counseling, and limited self efficacy (Meyers & Steinle, 1997).

Most of these suggested barriers should not be a problem for implementation in the United Air Force medical facilities. There are pharmacy and nutritional medicine departments within the medical facility and a Health and Wellness Center on base. These services can provide the drug consultation and diet modification, weight reduction, smoking cessation and exercise instructions. Since there are more support services in the Air force community, do the health care providers in the Air Force medical treatment facilities do a better job on prevention in terms of following the NCEP (1994) guidelines on cholesterol monitoring and treatment? Building a healthy community is one of the USAF medical service priorities. Disease prevention and health promotion have been

stressed again and again by our leaders over the past years. It is time for us to evaluate where we are in the prevention of coronary heart disease.

### Summary

The literature clearly shows that lifestyle modifications effectively lower the cholesterol level and significantly reduce the morbidity and mortality rate of coronary heart disease. The health care providers should periodically screen all clients' cholesterol level and instruct all clients about adopting healthy life habits as recommended by NCEP (1994) guidelines. There is very few literature found about compliance with the NCEP guidelines in military medical facilities. A review of the limited studies regarding the adherence to the NCEP guidelines shows that guidelines were poorly followed.

### CHAPTER III: METHODOLOGY

The purpose of this chapter is to describe the research design, sampling method, measurement tool development, data collection procedures, and data analysis. The reliability and the protection of human subjects will also be addressed.

#### Research Design

This study used a descriptive, quantitative design to describe health care providers' adherence to the National Cholesterol Education Program (NCEP, 1994) guidelines on cholesterol screening in adults without evidence of coronary heart disease. The researcher conducted a retrospective medical record review of adult outpatient medical records to collect data. The data were collected using a checklist developed by this researcher following the NCEP cholesterol screening and treatment algorithm.

#### Sampling and Setting

This study was conducted at an Air Force medical center located in an urban area in the northeastern United States. For inclusion in this study, the record needed to show that the client was: an active duty military member, 25 years of age or older, and not diagnosed with coronary heart disease (CHD) or renal failure prior to the cholesterol screening. A sample of 100 medical records that met the inclusion criteria was obtained from the Primary Care Clinic, the Family Practice Clinic, and Outpatient Medical Record office. The researcher reviewed these medical records.

### Procedure

This study used a checklist to audit medical records to determine how closely the health care providers follow the NCEP guidelines on cholesterol screening in adults without CHD. The researcher developed the checklist by following the algorithm of the NCEP cholesterol screening and treatment.

The checklist (see Appendix B) included demographic data, NCEP (1994) coronary heart disease risk factors, and other specific information relevant to NCEP guidelines. The demographic data included date of birth, sex, military status, and the type of provider (physician, nurse practitioner, or physician assistant) providing the care. The information on type of provider would not be used to describe providers' adherence to the guidelines. The specific information relevant to NCEP guidelines included total cholesterol level, HDL-cholesterol level, LDL-cholesterol level, providing counseling on diet, providing counseling on physical activity, providing counseling on smoking cessation if a smoker, the time frame for follow-up recommended by the health care provider. In addition, coronary heart disease risk factors were assessed that included family history of premature CHD, cigarette smoking, and history of hypertension. The risk factor information was obtained from the Preventive Health Assessment survey, Health Risk Appraisal survey, or Standard Form 600 that were part of the medical record.

The medical record was not included in the review, if it showed that the client was younger than 25 years of age or the client had a diagnosis of coronary heart disease or renal failure. People with these vascular-involved conditions need more aggressive treatment.

The documented data on the medical record dated from April 1994 to July 1999 was reviewed. If the record was documented as: (a) pregnant in July 1999, (b) within six months of postpartum in July 1999, or (c) breast-feeding baby in July 1999, then the researcher reviewed her medical record from the date of her last menstrual period (LMP) backward to 63 months prior to her LMP. Since estrogen affects cholesterol level and estrogen level is much different during pregnancy, postpartum, and breast-feeding period, the cholesterol screening for these women might be postponed to avoid these non-representative results of the usual cholesterol level (ODPHP, 1998; Vander, Sherman, & Luciano, 1998).

### Reliability

A pilot study of review was conducted at the same medical facility after the proposal was approved by the Institutional Review Board of the Uniformed Services University of Health Sciences (USUHS) and by the designated facility. The researcher reviewed ten medical records. And two weeks later, the researcher reviewed the same ten medical records again to establish the intra-rater reliability. The goal of the reliability was at least 0.8. If it was less than 0.8, the medical records would be rechecked until the intra-rater reliability was equal or greater than 0.8. In the pilot study, only one total cholesterol value was missed. The goal of 0.8 intra-rater reliability was met, the missed information was added, then the ten medical records were included in the study. The medical records were always reviewed twice if there was missing information throughout the data collection.

### Protection of Human Rights

A copy of the thesis proposal was submitted to the Institutional Review Board (IRB), Research Administration at the USUHS prior to the initiation of the study. Once approval to conduct the study was obtained, a copy of IRB approval from USUHS was submitted to the designated facility for permission to conduct the study at the designated medical center.

The patient and the provider confidentiality were protected at all times. Data collection did not include any material containing names, social security numbers, or anything that might lead to the identification of clients or health care providers. Medical records were obtained directly from the Primary Care Clinic, the Family Practice Clinic, or the Outpatient Medical Record office, reviewed in the clinic or Medical Record office, and returned to the clinic or Outpatient Medical Record personnel immediately upon the completion of the medical record review. Medical records were not removed from the clinic or the Outpatient Medical Record office. The checklist did not contain any identification information. Data obtained from medical record review were compiled and presented in the aggregate.

### Data Analysis

The researcher used descriptive statistics to answer each research question regarding the adherence to the NCEP (1994) guidelines on cholesterol level screening frequency, dietary counseling, exercise counseling, risk factors reduction and follow-up instruction. These frequencies and percentages were displayed in several tables

according to client's cholesterol level, i.e., borderline hypercholesterolemia and diagnosed hypercholesterolemia.

### Summary

The researcher conducted a retrospective medical record review using a checklist to describe health care providers' adherence to the National Cholesterol Education Program (1994) guidelines on cholesterol screening in adults without evidence of coronary heart disease. A pilot study was conducted to determine intra-rater reliability. Efforts were taken to protect the confidentiality of the clients, the health care providers, and the military medical center. A total of 100 records that met inclusion criteria were reviewed. Results were described using descriptive statistics frequency and percentage and displayed in various tables.

## CHAPTER IV: FINDINGS OF THE STUDY

This chapter will present the demographic characteristics of the sample, the results of the medical record review of adult outpatient medical records, and the analysis of the data.

### The Sample

There were 100 medical records of active duty military personnel meeting the inclusion criteria reviewed, which included 96 Air Force, one Army, one Coast Guard, one Marine, and one Navy record. Of these 100 records, 69 were men and 31 were women. Seventy nine percent of the subjects were younger than 40, 22% were 25 to 29, 27% were 30 to 34, and 30% were 40 to 44, 19% were 40 to 49 years old, and 2% were equal to or older than 50 years old at the time their medical records were reviewed.

There were 72 non-smokers (included 7 ex-smokers and 65 people who had never smoked), 5 people without documented smoking status and 23 smokers (see Table 1).

There were 75 records with an existing cholesterol value in the past five years, 18 of them were reviewed with patients by physicians, 21 were reviewed by physician assistants, and seven records were reviewed by nurse practitioners. In 29 of the 75 medical records, it was impossible to identify which type of care provider ordered or reviewed the test results. Because some of the test results were only found in the laboratory reports, the provider's title was not displayed, and there was no documentation on Standard Form 600 about the treatment or discussion of the test results with patients. For the remaining 25 medical records, no cholesterol results were found.



**Table 1****Demographic Characteristics of the Sample (Total = 100)**

Characteristic	Frequency	Percent
Age		
25 – 29	22	22%
30 – 34	27	27%
35 – 39	30	30%
40 – 44	13	13%
45 – 49	6	6%
50 – 54	1	1%
55 – 59	1	1%
Sex		
Male	69	69%
Female	31	31%
Military Status		
U. S. Air Force	96	96%
U. S. Army	1	1%
U. S. Coast Guard	1	1%
U. S. Marine	1	1%
U. S. Navy	1	1%
Tobacco Use		
Smoker	23	23%
Non-Smoker	72	72%
Not Documented	5	5%
Total	100	100%

## Adherence to NCEP Guidelines

### Adherence to Recommended Screening Frequency

The National Cholesterol Education Program (NCEP) guidelines for cholesterol screening state that adults 20 years of age and older should have a measurement of total blood cholesterol at least once every five years; HDL-cholesterol should be measured at the same time if accurate results are available (National Cholesterol Education Program, 1994).

There were 100 medical records reviewed, 75 of them (75%) had at least one total cholesterol test result found in the past five years, but the other 25 records reviewed had no cholesterol result found in the medical record. Among the 75 with a total cholesterol value, only 55 medical records had a HDL-cholesterol value, and the other 20 records had no HDL-cholesterol value documented. According to NCEP (1994) guidelines, the HDL-cholesterol should be included at the initial cholesterol screening only when accurate results are available. Therefore, the initial cholesterol screening rate was counted as 75% in this study, because accurate HDL-cholesterol was not available.

Of the 20 without a HDL-cholesterol value, 13 of them had normal total blood cholesterol (less than 200 mg/dL), and seven of them had borderline high blood cholesterol (between 200 mg/dL and 239 mg/dL). In clinical practice, if the total blood cholesterol value is normal, usually the care providers will not pursue further testing. But care providers of these seven patients with borderline high blood cholesterol should have ordered further testing according to guidelines.

Of the 25 without a total cholesterol value in the medical records, two of them indicated on the Preventive Health Assessment survey that they had cholesterol checked in the past five years, but the researcher was unable to find the cholesterol value in the medical record. There were notes on Standard Form 600 in six of the 25 medical records which indicated that the cholesterol test was ordered, but no cholesterol value was found in the medical records. The lack of test results could be due to the patients non-compliance for blood drawing, or the test results not put in the medical records. Because laboratory results were kept in the Composite Health Care System (CHCS), military medical treatment facilities were instructed that it was not required to put the hard copy of laboratory test reports in the medical record several years ago. Therefore, the actual cholesterol screening rate might be higher than 75% in this particular Air Force medical facility (see Table 2).

**Table 2**

**Total Cholesterol Screening Rate**

Total Cholesterol Checked	Frequency	Percent
Yes	75	75%
No	25	25%
Total	100	100%

Of the 75 with a total cholesterol value in their medical records, 42 of them had a total blood cholesterol level that was normal (less than 200 mg/dL), 28 of them were borderline high blood cholesterol (200 to 239 mg/dL), and five of them had high blood cholesterol (equal to or greater than 240 mg/dL) (see Table 3).

**Table 3**

**Total Cholesterol Level Distribution**

Total Cholesterol Level	Frequency	Percent
< 200 mg/dL	42	56%
200 to 239 mg/dL	28	37%
≥ 240 mg/dL	5	7%
Total	75	100%

**Adherence to Lifestyle Modification and Follow-up Instructions for Patients Whose Total Cholesterol was 200 – 239 mg/dL**

According to NCEP (1994) guidelines, if blood cholesterol is 200 – 239 mg/dL, HDL-cholesterol is equal to or greater than 35 mg/dL, and there are fewer than two coronary heart disease (CHD) risk factors besides elevated total cholesterol level, the care provider needs to provide information on dietary modification, physical activity, and risk factor reduction. And the care provider also needs to re-evaluate this person in one to two years. If a person with borderline high cholesterol (200 – 239 mg/dL) has HDL-

cholesterol less than 35 mg/dL, or has two or more other CHD risk factors, the care provider should order a lipoprotein analysis and give instruction on dietary modification, physical activity, and follow-up care according to the lipoprotein analysis results (see Appendix A).

Among the 28 people with borderline high blood cholesterol, 20 had HDL-cholesterol equal to or greater than 35 mg/dL and had fewer than two other CHD risk factors, one had HDL-cholesterol less than 35 mg/dL, and the other seven people had no HDL-cholesterol result in their medical records. Of the 20 people with HDL-cholesterol equal to or greater than 35 mg/dL and less than two other CHD risk factors, 13 of them received dietary modification instruction; 13 of them received exercise instruction; four were smokers and only two received smoking cessation instruction; three received specific follow-up instruction, two received “as needed” non-specific follow-up instruction and 15 of them did not receive any follow-up instruction.

The guidelines (NCEP, 1994) recommended lipoprotein analysis for the one with HDL-cholesterol less than 35 mg/dL and for two of the seven without HDL-cholesterol value in the record who had two or more other CHD risk factors. One of the three people had lipoprotein analysis done. Two of them received dietary modification instruction; two of them received physical activity instruction; two of them were smokers and both received smoking cessation instruction; none of them received any follow-up instruction.

The other five people without HDL-cholesterol values had less than two other CHD risk factors. Two of the five received dietary modification instruction; two received exercise instruction; three of them were smokers and only two received smoking cessation instruction; one received specific follow-up instruction and one received “as needed” non-specific follow-up instruction (see Table 4).

**Table 4**

**Lifestyle Modification Instructions Provided to People with Total Cholesterol 200 – 239 mg/dL (Total 28 People)**

*20 people with HDL-cholesterol = or > 35 mg/dL and fewer than 2 other CHD risk factors*

	Yes	No	Total
Diet Instruction	13 (65%)	7 (35%)	20 (100%)
Exercise Instruction	13 (65%)	7 (35%)	20 (100%)
Smoking Cessation Instruction*	2 (50%)	2 (50%)	4 (100%)
Follow-Up Instruction	5 (25%)	15 (75%)	20 (100%)
Specific Instruction	3 (15%)		
Non-Specific Instruction	2 (10%)		

**Table 4 Cont.**


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*5 people without HDL-cholesterol value and fewer than 2 other CHD risk factors*

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	Yes	No	Total
Diet Instruction	2 (40%)	3 (60%)	5 (100%)
Exercise Instruction	2 (40%)	3 (60%)	5 (100%)
Smoking Cessation Instruction*	2 (67%)	1 (33%)	3 (100%)
Follow-Up Instruction	2 (40%)	3 (60%)	5 (100%)
Specific Instruction	1 (20%)		
Non-Specific Instruction	1 (20%)		

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*3 people with HDL-cholesterol < 35 mg/dL or 2 or more other CHD risk factors*

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	Yes	No	Total
Lipoprotein Analysis	1 (33%)	2 (67%)	3 (100%)
Diet Instruction	2 (67%)	1 (33%)	3 (100%)
Exercise Instruction	2 (67%)	1 (33%)	3 (100%)
Smoking Cessation Instruction*	2 (100%)	0 (0%)	2 (100%)
Follow-Up Instruction	0 (0%)	3 (100%)	3 (100%)

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\* Smoking cessation instruction applied to smokers only, so the total number was different.

In short, there were 28 people who had borderline high total cholesterol, 17 of them received instruction on dietary modification and 17 of them received instruction on

physical activity, too. There were nine current smokers in this group, six received smoking cessation instruction. Four of the 28 people received specific follow-up instruction which was consistent with the guidelines.

Adherence to Lifestyle Modification and Follow-up Instructions for Patients Whose Total Cholesterol was Equal to or Greater Than 240 mg/dL

There were five people whose total blood cholesterol levels were equal to or greater than 240 mg/dL. According to NCEP (1994) guidelines, these people need to have lipoprotein analysis completed. Four of the five people had lipoprotein analysis results in their medical records. Three of the four had borderline high LDL-cholesterol level (130–159 mg/dL), while the other one had high LDL-cholesterol level ( $> 160$  mg/dL). Three of the five people received dietary modification instruction, and two received exercise instruction. Three non-smokers and two smokers were in this group. One of the smokers received smoking cessation instruction. Two of the five people received specific follow-up instruction, and the other three only received “as needed” non-specific follow-up instruction (see Table 5).



**Table 5****Lifestyle Modification Instructions Provided to People with Total Cholesterol > 240 mg/dL**

	Yes	No	Total
Dietary Modification Instruction	3 (60%)	2 (40%)	5 (100%)
Exercise Instruction	2 (40%)	3 (60%)	5 (100%)
Smoking Cessation Instruction*	1 (50%)	1 (50%)	2 (100%)
Follow-up Instruction	5 (100%)	0 (0%)	5 (100%)
Specific Instruction	2 (40%)		
Non-Specific Instruction	3 (60%)		

\* Smoking cessation instruction applied to smokers only. There were 2 smokers and 3 non-smokers

There were only five people with high total blood cholesterol (equal to or greater than 240 mg/dL). Since both this group and the group of borderline high blood cholesterol with HDL-cholesterol less than 35 mg/dL or with two or more non-lipid CHD risk factors needed to have lipoprotein analysis, these two groups will be combined as a new group for discussion.

There were eight people in the above mentioned combined group. According to NCEP (1994) guidelines, these people need to have lipoprotein analysis completed. Five of the eight people had lipoprotein analysis results in their medical records. One of the five had desirable LDL-cholesterol level (less than 130 mg/dL), three had borderline high LDL-cholesterol level (130–159 mg/dL), while the other one had high LDL-cholesterol

level ( $> 160$  mg/dL). Five of the eight people in this combined group received dietary modification instruction; four received exercise instruction. There were four non-smokers and four smokers in this group. Three of the four smokers received smoking cessation instruction. Two of the eight people received specific follow-up instruction, and three received “as needed” non-specific follow-up instruction and three did not receive any follow-up instruction (see Table 6).

**Table 6**

**Lifestyle Modification Instructions Provided to People in Combined Group**

	Yes	No	Total
Lipoprotein Analysis	5 (63%)	3 (37%)	8 (100%)
Dietary Modification Instruction	5 (63%)	3 (37%)	8 (100%)
Exercise Instruction	4 (50%)	4 (50%)	8 (100%)
Smoking Cessation Instruction*	3 (75%)	1 (25%)	4 (100%)
Follow-up Instruction	5 (63%)	3 (37 %)	8 (100%)
Specific Instruction	2 (40%)		
Non-Specific Instruction	3 (60%)		

\* Smoking cessation instruction applied to smokers only. There were 4 smokers and 4 non-smokers

**CHD Risk Factor Reduction**

The CHD risk factors include elevated cholesterol level, advanced age (or woman has premature menopause without estrogen replacement therapy), family history of

premature CHD, cigarette smoking, hypertension, low HDL-cholesterol, and diabetes mellitus (NCEP, 1994). There were 33 people with elevated total cholesterol level, 23 current smokers, 12 people with family history of premature CHD, six people with hypertension, six people with high risk age, five people with low HDL-cholesterol, and no one with premature menopause or with diagnosed diabetes mellitus. Among these risk factors, smoking is the number one modifiable risk factor for coronary heart disease and is the second most prevalent risk factor in the sample of this study. Of the 100 people, there were 23 smokers (23%), 72 non-smokers (72%) which included 65 people who had never smoked and seven ex-smokers, and five people (5%) without documented smoking status in this study sample. Eighteen of the 23 smokers (about 78% of smokers) received smoking cessation instructions and five did not.

#### Follow-Up Instruction

There were 33 people with abnormal total cholesterol level. According to NCEP (1994) guidelines, they should be re-evaluated within one to two years unless they had desirable LDL-cholesterol (less than 130 mg/dL), and people with desirable LDL-cholesterol only needed re-evaluation in five years. Among these 33 people, there were 30 people whose LDL-cholesterol was greater than 130 mg/dL, but only six people received specific follow-up instruction which adhered to the guidelines, and another six people received non-specific “as needed” instruction. There were 21 people who did not receive any kind of follow-up instruction. The key to building a healthy community is prevention. If people with the borderline high blood cholesterol were not monitored closely and treated in the early stage of the disease process, they might progress to high cholesterol and cause permanent damage to their cardiovascular system. Health care

providers need to pay more attention to the follow-up issues and give more specific instruction.

### Summary

A total of 100 active duty military outpatient medical records were reviewed. Of these 100 people, 69 were men and 31 were women, 79% of the sample was less than 40 years old, 19% were 40 to 49 years old, and 2% were 50 to 59 years old. There were 65 people who had never smoked, seven ex-smokers, 23 current smokers, and five people without documented smoking status. There were 33 people who had elevated high cholesterol level, 12 people who had family history of premature coronary heart disease, six people who had hypertension, and six people who had high risk age, five people with low HDL-cholesterol, but there was no one diagnosed with diabetes or premature menopause.

When the researcher examined data concerning the extent to which the health care providers adhere to NECP (1994) guidelines pertaining to cholesterol screening and the use of lifestyle modification management, it was found that 75% of the 100 people had their total cholesterol levels checked in the previous five year period; 55% had both total cholesterol and HDL-cholesterol results, and 20% had total cholesterol value only. Of these 75 with total cholesterol value in their medical records, 42 had normal blood cholesterol, 28 had borderline blood cholesterol, and five had high blood cholesterol.

There were 20 people who had borderline high blood cholesterol, HDL-cholesterol equal to or greater than 35 mg/dL, and less than two other CHD risk factors. Thirteen of them received dietary modification instruction; also thirteen of them received exercise instruction; four of them were smokers and only two of the smokers received smoking

cessation instruction; and only three of the 20 people received specific follow-up instruction which adhered to NCEP guidelines (1994).

According to NCEP (1994) guidelines, there were eight people meeting the criteria for lipoprotein analysis, but only five people had it done. Among these eight people, five of them received dietary modification instruction; four received exercise instruction; four smokers and three non-smokers received smoking cessation instruction; and two received specific follow-up instruction. Smoking is the number one modifiable risk factor for coronary heart disease and there were 23 smokers, but only 18 received smoking cessation instruction.

In summary, there were 33 people who had an abnormal total cholesterol level, 20 of them (about 61%) received dietary modification instruction, 19 of them (about 58%) received physical activity instruction, and 30 of them needed to be re-evaluated within one to two years, but only six of these 33 people (about 18%) received specific follow-up instruction which adheres to the NCEP (1994) guidelines.

## CHAPTER V: CONCLUSIONS AND RECOMMENDATIONS

### Introduction

Coronary heart disease (CHD) remains the single leading cause of death in America today, and there are more than thirteen million people who currently suffer from CHD (American Heart Association, 1998). In order to prevent the suffering from CHD, save lives, minimize financial burden, and effectively utilize the limited resources, prevention is the best solution. Increased total cholesterol is one of the CHD risk factors. Following National Cholesterol Education Program (NCEP, 1994) guidelines, screening client's cholesterol level, detecting the elevated level and treating it in early stages are the keys to prevent CHD. The purpose of this study was to describe the adherence to the NCEP guidelines pertaining to cholesterol screening, and the use of lifestyle modification management for treating high cholesterol in adults without evidence of CHD, by health care providers in a United States Air Force medical treatment facility.

A retrospective medical record review was conducted using a checklist to determine how closely the health care providers followed the NCEP (1994) guidelines on cholesterol screening, lifestyle modification instructions, and the provision of follow-up instructions in adults without evidence of CHD. The researcher developed the checklist by following the algorithm of the NCEP cholesterol screening and treatment.

With permission, a sample of 100 medical records that met the inclusion criteria were obtained from the Primary Care Clinic, the Family Practice Clinic and Outpatient Medical Record Office. The researcher reviewed the documented data on the medical record dated from April 1994 to July 1999 after the intra-rater reliability of 0.9 was obtained from a pilot study. The confidentiality of the clients, the health care providers,

and the military medical center was protected at all times.

### Conclusion

In this study, 75% of the 100 medical records reviewed had at least one total cholesterol result found in the five-year period. The cholesterol screening rate in this study was higher than 51% to 57% cholesterol screening rate by the private practice physicians in the study conducted by Browner et al. (1994). It was also higher than the self reported 62% of nurse practitioners in adult settings who routinely provided cholesterol screening (Lemley et al., 1994), and higher than the 59% screening rate by interns in patients admitted to coronary care unit of a university affiliated teaching hospital in 1996 (Frolkis et al., 1998). This higher screening rate was probably due to the fact that in the military, such as USAF, there was a Physical Examination Section that automatically scheduled every service member to have blood cholesterol checked every five years following a specific schedule. Another explanation may be that NCEP (1994) guidelines were more widely disseminated in the military medical community and care providers were more familiar with the guidelines. Furthermore, preventive care had been heavily stressed for several years in the Air Force medical facilities, since building a healthy community was one of the priorities of the USAF Medical Service.

This study showed 42 of the 75 people (56%) had a normal total cholesterol level. Twenty-eight of the 75 people (about 37%) had borderline high blood total cholesterol which was 200 to 239 mg/dL, and five people (about 7%) had high blood total cholesterol which was equal to or greater than 240 mg/dL.

There were 33 people who had elevated total cholesterol level in this sample, 20 of them (about 61%) received dietary modification instruction, and 19 of them (about 58%)

received physical activity instruction. There were 11 current smokers in this group, and seven (about 64%) received smoking cessation instruction. Six of the 33 people (about 18%) received specific follow-up instruction that was consistent with the guidelines.

In the study of improving resident physicians compliance with NCEP (1994) guidelines, Headrick et al. (1992) found their baseline compliance in identifying and treating patients with high cholesterol level was 39% and the post-intervention compliance was 41.8% to 50.6%. They also found one hundred percent of these resident physicians responded favorably to having a nurse or nurse practitioner screen their patients for hypercholesterolemia and to have their patients participate in a program to teach them about high cholesterol. In the Browner and colleagues' study (1994), the compliance rate in the private practice physicians was 33% to 37% after different intensity continuing medical education. A retrospective medical record review of 225 coronary care unit patient's records by Folkis and others (1998) revealed that only 4% of the smokers received smoking cessation counseling, 14% of patients were referred to dietitians, and about one percent of patients were encouraged to exercise. Although 58% to 64% compliance rate in this military medical facility was slightly higher than the first two studies and much higher than the third study findings, the care providers could provide more lifestyle modification counseling to patients since early intervention may prevent cardiovascular complications. Appointing a dedicated registered nurse or nurse practitioner as the educator to teach patients about lifestyle modification or offer small group teaching and discussion sessions may improve the provider's compliance rate.

Regardless of the cholesterol level, of the 100 people, there were 23 smokers (23%), 72 non-smokers (72%), and five people (5%) without documented smoking status



in this study sample. Eighteen smokers (about 78% of smokers) received smoking cessation instructions, which was higher than the Pearson et al. (1996) report of 40% to 55% of smokers received physician's advice on smoking cessation. In the same study, Pearson et al. found that 75% of the smokers said they would attempt to stop smoking if their physicians would advise them to do so. Since care providers have great influence on patients' health related daily practice, they should be more aggressive on advising patients to stop smoking.

#### Recommendations for Education

Many clinical trials demonstrated conclusively that lifestyle modification lowered blood cholesterol level and decreased new CHD events and CHD mortality in people without evidence of CHD (Halperin et al., 1999), but this therapeutic modality is still markedly underutilized in borderline risk and high risk asymptomatic population. It is important to stress the significance of preventive care and integrate the clinical trials findings into the health care providers' formal and post-graduate continuing education to increase their awareness that the effort to incorporate prevention into routine practice is paramount in achieving the goal of building a healthy community.

The care providers also need to know that they have great influence on patients' health promotion practices. As described by Pearson and colleagues (1996) 75% of smokers said they would attempt to stop smoking if their physicians advised them to do so, while only 40% to 55% of smokers actually received physician's advice on smoking cessation. If the care providers are aware that they have powerful affect on their patients' health related behaviors, they may devote more effort on patients' lifestyle modification.

### Recommendations for Practice

During the medical record review and in actual clinical practice, the researcher found that if Standard Form 600 (SF 600) with the overprint of health promotion lifestyle modification instructions was used, care providers were more likely to document the items that they discussed with patients. The printed lifestyle modification instructions served to remind care providers of issues that may need to be addressed, and also served as documentation. Since a typical appointment is only fifteen to twenty minutes and lifestyle modification counseling is very time consuming, the SF 600 with printed health promotion measures could save documentation time and improve the providers' documentation practice.

The researcher also found that some of the medical records had no documentation on patient's smoking status, alcohol consumption, current vital signs, or height and weight. This is the era of prevention, and this information will enable care providers to quickly assess the needed lifestyle modifications at a glance. It is a shared responsibility, the providers must clarify with the technicians their roles and responsibilities for monitoring and documenting this information on SF 600 at every outpatient visit.

As shown in the Headrick et al. study (1992), one hundred percent of the surveyed resident physicians responded favorably to having a nurse or nurse practitioner screen their patients for hypercholesterolemia and to having their patients participate in a program to teach them about high cholesterol. In the USAF, the Physical Examination section is responsible for scheduling a blood cholesterol check every five years for every service member. But in this study, 25% of the records did not have cholesterol documented in the previous five-year period. Apparently, a better follow-up system is

needed. In the meantime, if the clinic can designate a dedicated registered nurse as health educator to provide the on site in-depth teaching, patients may benefit more. Where there is no on-site full time educator, care providers can provide the written information and/or refer patients to a registered dietitian or to Health and Wellness Center for more in-depth lifestyle modification counseling.

The hard copy of lab results is no longer put in patient's medical record. In order to maintain a complete lab test history for future reference, health care providers should inform the service members to request a copy of the complete laboratory test results to put into their medical records prior to permanent change of station.

#### Recommendations for Future Study

The biggest problem the researcher had encountered in this study was that many medical records were without complete laboratory reports. Because the computer system, Composite Health Care System (CHCS), is not connected among different military medical facilities in the continental USA or around the world, the researcher was only able to access the patients' laboratory test results through CHCS for tests performed in this particular medical facility. After discussing with the person in charge of the CHCS in the local medical facility, the researcher learned that it is possible to link the CHCS together among all military medical facilities in the continental USA. In order to obtain more accurate data, the future researcher can seek the assistance from medical information systems to connect the CHCS among military medical facilities in the continental USA. Additional studies could be done to evaluate the effect of lifestyle modification counseling, to compare the difference of the cholesterol level and risk

factors before the counseling and one year after the counseling.

Providers could be interviewed about their knowledge of hypercholesterolemia screening and lifestyle modification counseling, as well as any barriers or facilitators for providing cholesterol screening and lifestyle modification instruction to their clients.

### Summary

This study examined to what extent the health care providers in a United States Air Force medical treatment facility adhered to NCEP (1994) guidelines for screening and treatment of hypercholesterolemia in adults without evidence of CHD as documented in adult patients' outpatient medical records. It was discovered that the cholesterol screening rate was 75% which was much better than the compliance rate of private practice physicians in the other study and resident physicians in two university affiliated teaching hospitals. The compliance rate of providing lifestyle modification instruction were 58% to 64% in this military medical facility which also slightly higher than the findings of other studies. However, the follow-up instruction rate was poor, only 18% of people received specific follow-up instruction.

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## APPENDICES

APPENDIX A: Primary prevention in Adults without Evidence of CHD: Initial

Classification Based on Total Cholesterol and HDL-Cholesterol

APPENDIX B: Medical Record Review Checklist

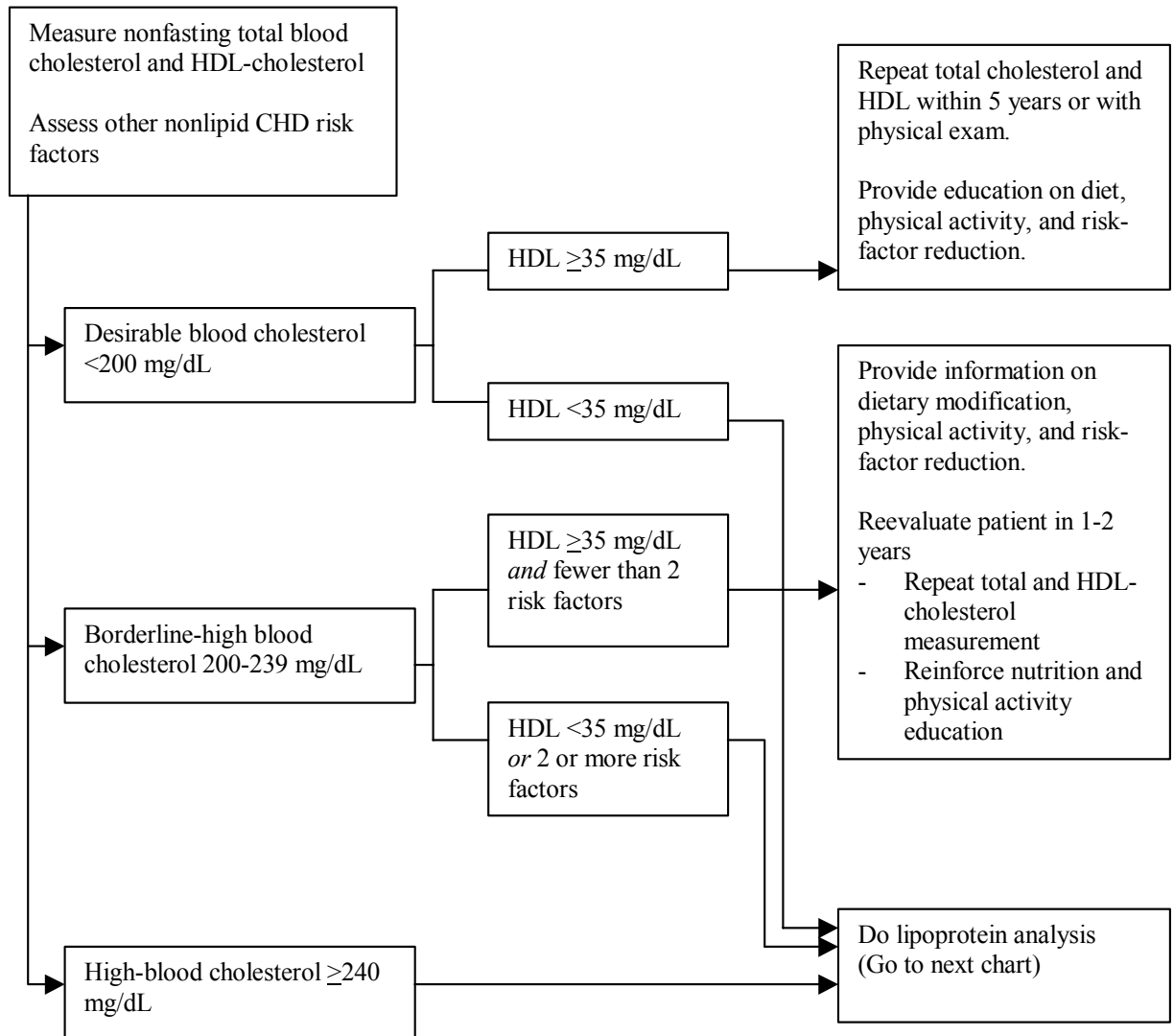
APPENDIX C: IRB Approval

APPENDIX D: Institution Approval for Data Collection

## APPENDIX A

### Primary Prevention in Adults Without Evidence of CHD: Initial Classification Based on Total Cholesterol and HDL-Cholesterol

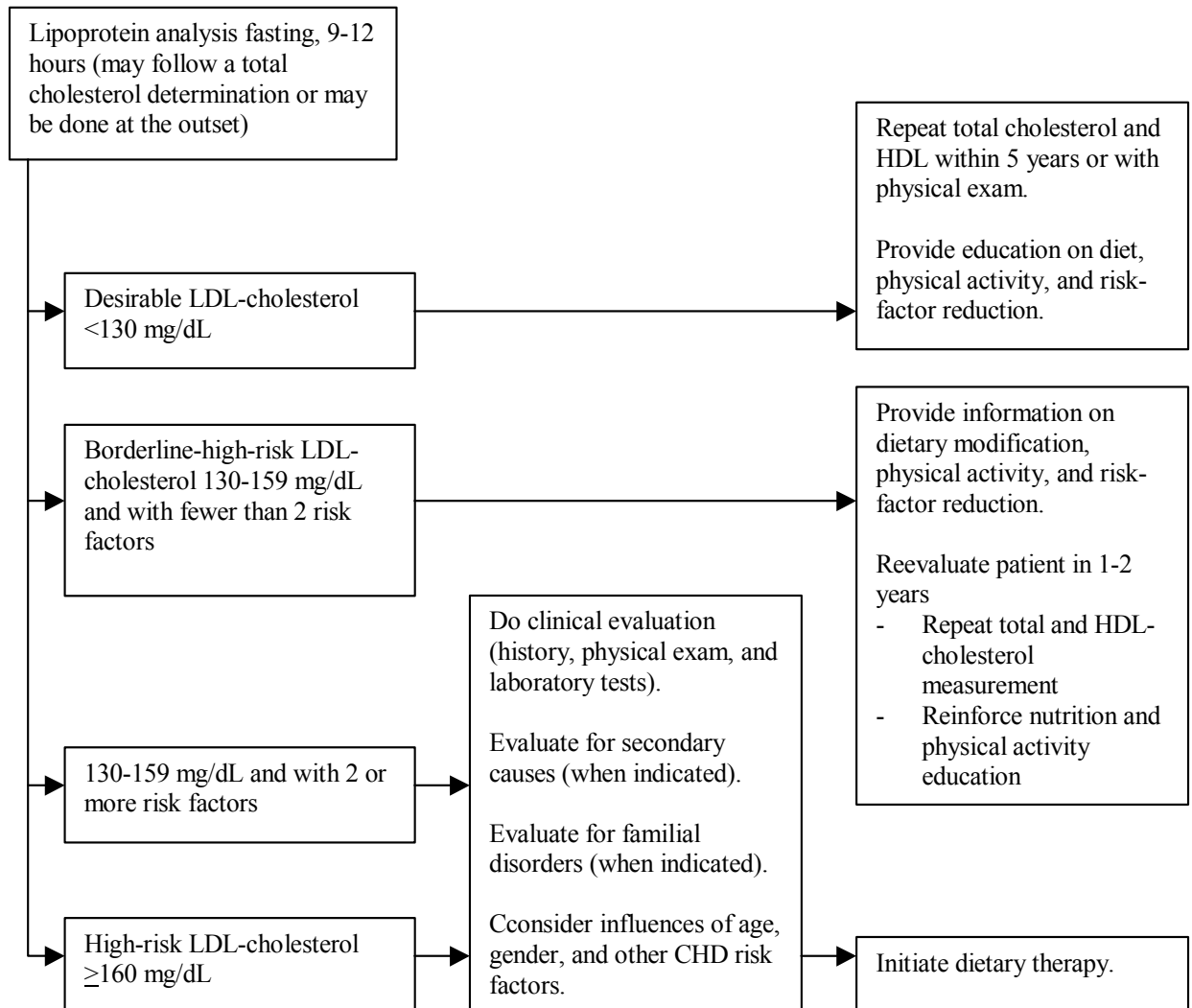
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APPENDIX A (Cont.)

**Primary Prevention in Adults Without Evidence of CHD: Subsequent Classification Based on LDL-Cholesterol**

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\* Source: Office of Disease Prevention and Health Promotion (1998). Put prevention into practice: Clinician's handbook of preventive services (pp. 228-229). Washington DC: U.S. Government Printing Office.

## APPENDIX B

### Medical Record Review Checklist

#### Part I. Demographic Data

1. Date of birth: \_\_\_\_\_
2. Sex: \_\_\_\_\_ male \_\_\_\_\_ female
3. Status: \_\_\_\_\_ active duty \_\_\_\_\_ AF \_\_\_\_\_ army \_\_\_\_\_ navy \_\_\_\_\_ marine
4. Provider type: \_\_\_\_\_ MD \_\_\_\_\_ NP \_\_\_\_\_ PA \_\_\_\_\_ other

#### Part II. Medical/Family History

1. Documentation of family history of premature CHD: \_\_\_\_\_ yes \_\_\_\_\_ no
2. Documentation of cigarette smoking: \_\_\_\_\_ smokes \_\_\_\_\_ never smoked  
\_\_\_\_\_ previous smoker \_\_\_\_\_ not documented
3. Documentation of hypertension: \_\_\_\_\_ yes \_\_\_\_\_ no
4. Documentation of diabetes mellitus: \_\_\_\_\_ yes \_\_\_\_\_ no \_\_\_\_\_ not documented
5. Documentation of premature menopause: \_\_\_\_\_ yes \_\_\_\_\_ no  
Estrogen replacement therapy: \_\_\_\_\_ yes \_\_\_\_\_ no

#### Part III. Lab Values/Counseling

1. Cholesterol level on chart: \_\_\_\_\_ yes \_\_\_\_\_ no
2. Total cholesterol: \_\_\_\_\_
3. HDL-cholesterol: \_\_\_\_\_
4. LDL-cholesterol: \_\_\_\_\_
5. Documented diet counseling: \_\_\_\_\_ yes \_\_\_\_\_ no
6. Documented physical activity counseling: \_\_\_\_\_ yes \_\_\_\_\_ no

APPENDIX B (Cont.)

7. Documented smoking cessation counseling:    \_\_\_\_ yes    \_\_\_\_ no
8. Documented weight reduction counseling:    \_\_\_\_ yes    \_\_\_\_ no
9. Documentation on the recommended time frame for follow-up:    \_\_\_\_ yes    \_\_\_\_ no
- If yes, in how many months?    \_\_\_\_\_

## APPENDIX C



UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES

4301 JONES BRIDGE ROAD  
BETHESDA, MARYLAND 20814-4799



July 23, 1999

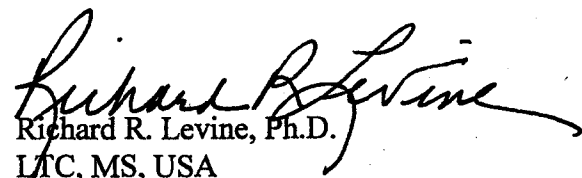
MEMORANDUM FOR JEN-JEN CHEN, GRADUATE SCHOOL OF NURSING

SUBJECT: IRB Approval of Protocol T061AR-01 for Human Subject Use

Your research protocol entitled "*Adherence to Hypercholesterolemia Management Guidelines by Health Care Providers in a USAF Medical Treatment Facility*," was reviewed and approved for execution on 7/23/99 as an exempt human subject use study under the provisions of 32 CFR 219.101 (b)(2). This approval will be reported to the full IRB scheduled to meet on 12 August 1999.

The purpose of this study is to describe the adherence to the National Cholesterol Education Program (NCEP) guidelines pertaining to cholesterol screening and the use of lifestyle modification management for treating high cholesterol in adults without evidence of coronary heart disease by health care providers in a USAF medical treatment facility. This study involves a retrospective record review to document how closely health care providers follow the NCEP guidelines on cholesterol screening in adults without coronary heart disease. The IRB understands that no patient or provider identifying information will be collected as part of this record review and that all results will be reported in the aggregate.

Please notify this office of any amendments you wish to propose and of any untoward incidents which may occur in the conduct of this project. If you have any questions regarding human volunteers, please call me at 301-295-3303.

  
Richard R. Levine, Ph.D.  
LTC, MS, USA  
Director, Research Programs and  
Executive Secretary, IRB

Cc: Director, Grants Administration



## APPENDIX D





DEPARTMENT OF THE AIR FORCE  
HEADQUARTERS 89TH AIRLIFT WING (AMC)

Date: 9 Sep 99

TO: Principle investigator

FROM: Janice M. Rusnak, Lt. Col.; Chief, Infectious Diseases; IRB Chair  
TSgt. Huff; IRB Administration

RE: Research study annual/final progress report

Dear Principal investigator:

Your study entitled, ADHERENCE TO HYPERCHOLESTEROLEMIA MANAGEMENT GUIDELINES BY HEALTH CARE PROVIDERS IN A UNITED STATES AIR FORCE MEDICAL TREATMENT FACILITY, Captain J. Chen. has been approved by the IRB as a human exempt study with a vote of 6 for, 0 against, and 0 abstain. This study is a chart review of active duty individuals without known coronary artery disease to assess compliance with the current guidelines for hyperlipidemia screening. The IRB approval is with the understanding that the results of this study have limitations in that it is a chart review, and is checking documentation which may not actually reflect what is occurring in the medical center. Specifically, laboratory tests are not included in the outpatient records any longer, and individuals may counsel on diet, weight reduction, and exercise for elevated lipids; but may not actually document this in the chart. Also, on page 24, we recommend changing the "efforts will be taken to protect the confidentiality of the clients, the health care providers, and the military medical center to a stronger wording. i.e. Confidentiality of the patients, health care providers, and medical center will be protected to the fullest extent.

As a reminder, any abstracts or papers published during the study should also be enclosed, however, they cannot be accepted as an annual or final report as per FDA regulations. If you plan to PCS or retire prior to the report being do, you must either close the study with a final report; or have a letter by a new primary investigator that they will resume responsibilities.

Thank you for participation in research at Malcolm Grow Medical Center, 89<sup>th</sup> Medical Group.

Sincerely,

JANICE M. RUSNAK, Lt. Col, USAF, MC  
Chief, Infectious Diseases