HEALTH PROFESSIONALS' ADVICE TO IOWA ADULTS WITH

HYPERTENSION USING THE 2002

BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM

By

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ABSTRACT

High blood pressure (HBP) is a risk-factor for many of the leading causes of premature death due to chronic disease. Research has shown that lifestyle modifications can decrease BP levels. Data on Iowa respondents (with HBP, N=1,050; without HBP, N=2,514) of the 2002 Behavioral Risk Factor Surveillance System were analyzed; weighting of variables allowed the results to reflect all adult Iowans. Regression analysis revealed that BP status was the best predictor of whether or not one received advice, despite HBP respondents being older (p < 0.001) and more overweight (p < 0.001). Results showed that Iowans with HBP were more likely to receive advice on all five health professionals' advice questions (odds ratio [OR] 2.75 for less high-fat/high-cholesterol foods, 2.22 for more fruits and vegetables, 2.29 to be more physically active, 2.35 to lose weight, and 2.27 to quit smoking). Conclusions support the hypothesis that persons with HBP receive more lifestyle modification advice from health professionals. However, low prevalence rates indicate that there is still room for improvement to advise at-risk patients more often.

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CHAPTER I

INTRODUCTION

Introduction

Advances of the twentieth and twenty-first centuries have dramatically
changed the lifestyles of nearly everyone in the world; health-related behaviors, mainly
nutrition, physical activity habits, and stress have led to a society where deaths are
dominated by chronic disease. Throughout all of these changes, one thing remains
constant among all human beings: everyone has a body and everybody has a heart.
Medical technology and rigorous research has shown us that a variety of factors impact
our heart's functioning both positively and negatively. Conditions of the heart can
directly impact one's quality of life (Shepherd 2003).

One risk factor for diseases of the heart and the rest of the cardiovascular
system is hypertension or high blood pressure. The following thesis seeks to explore, in
depth, the extent to which people are advised to control this risk factor by health
professionals that they have been in contact with.

Cardiovascular Disease and High Blood Pressure

Approximately 30% of all deaths in the United States are from cardiovascular
disease (CVD) (Centers for Disease Control - Cardiovascular 2003); at the end of the
twentieth century, CVD accounted for approximately 20% of all deaths globally (Marks

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and McQueen 2001). It is an enormous economic burden on the United States, with CVD accounting for well over $320 billion of our nation's medical care costs annually (CDC - Cardiovascular 2003; American Heart Association 1999). While some risk factors for CVD are non-modifiable (age, sex, race, family history), many can be controlled by implementing lifestyle modifications, namely, smoking cessation, proper diet, and regular physical activity.

High blood pressure (HBP) is known as "the silent killer." Lacking any signs and symptoms, HBP disrupts normal functioning of a healthy body. It is a contributor to many of the leading chronic diseases and major causes of death in the United States including CVD and stroke. HBP affects about one-fourth of adults in the U.S., and the numbers are rising. It often goes undetected; currently, 30% of people may be unaware that they have hypertension (*The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure* 2003).
In May 2003, the National High Blood Pressure Education Program (NHBPEP), a branch of the National Heart, Lung, and Blood Institute (NHLBI), issued its Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7) a set of clear, practical, and timely guidelines for physicians regarding the treatment and prevention of hypertension. The JNC-7 targets the physicians' role in the treatment of hypertension more than previous editions, emphasizing lifestyle modifications for persons with prehypertension (120-139 mmHg systolic or 80-89 mmHg diastolic) and hypertension (>140 mmHg systolic or >90 mmHg diastolic).

High Blood Pressure in Iowa

Not unlike the United States as a whole, the state of Iowa faces the rising burden of chronic disease. In Iowa, nearly one-fourth of residents have HBP, (Shepherd 2002; Shepherd 2003). From 1991-1995, there were a total of 47,076 deaths in Iowa due to various forms of heart disease. This translates into a death rate of 478 out of every 100,000 deaths being due to this largely preventable chronic disease (Centers for Disease Control 1999). The national average for this time period was 520 deaths per every 100,000, ranking Iowa as 20th out of 51 states (including District of Columbia) in death rates due to heart disease (CDC 1999).

Behavioral Risk Factor Surveillance System

The Behavioral Risk Factor Surveillance System (BRFSS) is a nationwide telephone survey conducted by the CDC. Health risk behaviors that are the major contributors to illness, disability, and death are measured. Non-institutionalized, civilian adults over 18 years old are eligible to participate. The BRFSS is conducted in all 50 states, the District of Columbia, Puerto Rico, Guam, and the U.S. Virgin Islands. Annual data collected can be used to assess how often people are receiving advice from their health professional (physician, nurse, or other) to modify their lifestyle.

Behavioral Modification Advice

Evidence-based clinical trials have shown repeatedly that behavioral modifications can significantly improve health outcomes. Guidelines such as the JNC-7 cite the physicians' role in informing patients about behavioral modifications. Many barriers to conveying the advice about prevention and excuses for not giving advice about

prevention are discussed below. Ultimately, advice should be given to all patients regarding the benefits of a sound diet, physical activity, and smoking cessation, especially those who exhibit at risk characteristics, namely HBP and overweight.

Taking the disease and risk factor-related statistics, as well as the clinical outcomes of well-designed studies and implementing them into real-life applications is known as the art of translating research into practice (TRIP). The Agency for Healthcare Research and Quality (AHRQ) is an advocate of taking original research recommendations and implementing them into routine clinical practice. Guidelines for the management of blood pressure have been developed from the rigorous research for physicians to use in the clinical setting (Medical University of South Carolina, 2003); they will be discussed later.

Objective

This investigation using Iowa BRFSS data sought to identify how often health professionals in Iowa recommended health-promoting lifestyle modifications to assist in the management of high blood pressure. Further, to see if people who are overweight or obese, an additional risk factor for CVD, receive advice to assist in the management of their HBP.

Primary Hypothesis

The hypothesis is that individuals with HBP will receive significantly more lifestyle advice, defined as receiving two (2) or more prevention messages from their health professional, when compared to the non-HBP group.

Secondary Hypothesis

Respondents categorized as overweight or obese (BMI $\geq$ 25 kg/m^2) and having HBP will receive significantly more lifestyle advice when compared to respondents categorized as normal weight (BMI < 25 kg/m^2) who have HBP.

Definition of Terms

Behavioral modification – Adoption of lifestyle habits to improve health status. Examples include: weight reduction in overweight individuals, sound dietary habits, smoking cessation, physical activity, and moderation of alcohol consumption. Used interchangeably with lifestyle modification.

Body Mass Index (BMI) – Measure of height and weight recorded in kilograms over meters squared (kg/m^2).

Cardiovascular disease (CVD) – A disease that includes conditions characterized by dysfunction of the heart and blood vessels.

Diastolic blood pressure (DBP) – Blood pressure reading when the ventricles relax. Measured in millimeters of mercury (mmHg).

Health professional – Doctor, nurse or other educated person in the health field that respondents may encounter in a health care setting. Examples include: Registered dieticians, diabetes educators, or certified health education specialists.

Hypertension, Stage 1 – Condition of chronic high blood pressure, classified as systolic blood pressure (SBP) 140-159 mmHg or diastolic blood pressure (DBP) 90-99 mmHg (Chobanian 2003).

Hypertension, Stage 2 – Condition of chronic high blood pressure, classified as systolic blood pressure >160 or diastolic blood pressure >100 (Chobanian 2003).

Lifestyle modification – Adoption of lifestyle habits to improve health status. Examples include: weight reduction in overweight individuals, sound dietary habits, smoking cessation, physical activity, and moderation of alcohol consumption. Used interchangeably with behavioral modification.

Obese – Condition of being overweight with a BMI >30 kg/m^2; puts patients at increased risk for chronic disease.

Overweight – Condition of being overweight with a BMI 25-30 kg/m^2; puts patients at increased risk for chronic disease.

Prehypertension – Blood pressure level indicates increased risk for progression of hypertension. Systolic blood pressure 120-139 or diastolic blood pressure 90-99 (Chobanian 2003).

Systolic blood pressure (SBP) - Maximum pressure achieved as the ventricles of our heart contract and force blood out into our bodies. Measured in millimeters of mercury (mmHg).

Limitations

This study was not conducted without limitations. Since the BRFSS is a telephone survey, persons without telephones are automatically excluded. In 1999, the Centers for Disease Control and Prevention reported that 89-99% of households in the United States had telephones. The Iowa Department of Public Health published that 97% of households in Iowa have telephones (Shepherd 2003). Households with low-income

levels tend to be the ones without telephones. In addition, caller ID, increasing cell phone usage, and call blockers may pose problems in reaching certain adults. In addition, only non-institutionalized and civilians are polled. Thus, the results can not be projected onto institutionalized or military people.

All information from the BRFSS is self-reported. It is widely known that people tend to misrepresent their true weight and height. People who are overweight tend to underestimate their weight, and all people overestimate their height (Mokdad et al. 2003). Other information may be withheld, misreported, or a respondent simply may not recall their behaviors on certain health risk factors. Previous studies have shown that information on CVD risk factors, such as those explored here, are reliable when self-reported (Galuska et al. 1999).

Because all questions in the BRFSS are asked using specific wording, participants may perceive the context differently. When asked, "In the past 12 months, has a doctor, nurse, or other health professional advised you to eat more fruits and vegetables?", respondents could view the definition of "health professional" or "advised" differently. For example, one respondent might consider a pharmacist a health professional and another may not. "Advised" could mean receiving a pamphlet to one respondent, while another may consider "advice" nothing less than a five-minute conversation with their physician. These limitations must be kept in mind when interpreting the results.

When analyzing the data, namely, the five questions making up the independent variable (lifestyle modification advice) no allowances were made for missing data from respondents. Since the sample size is so large, one can assume with

confidence that the few unreported cases for each questions make negligible impacts on any statistical reporting.

One of the five questions making up the independent variable relates to smoking and was only asked to persons who smoke. Only 23% of the Iowa population reports to be a smoker (Shepherd 2003). It is important to note that because smokers have one more risk factor than non-smoking respondents, they have the opportunity to receive advice from a health professional in one additional area, therefore increasing their chances of having received advice.

Similarly, another component of the independent variable was whether or not a respondent had received advice to lose weight. Although a majority of respondents, especially those with hypertension, are overweight, it is obviously not appropriate for a person of normal weight to receive advice to lose weight. The impact of this is that the operational definition of the independent variable is to receive advice on two or more of the five pieces of lifestyle modification advice. If a person is of normal weight, it is unlikely that they've received any advice to lose weight.

Assumptions

The questions that were asked to BRFSS respondents regarding advice from a health professional were all worded with the terminology "doctor, nurse, or other health professional." It is the position of the author that health professionals practice in locations other than the physician's office. Registered dieticians, pharmacists, physical therapists, certified health education specialists, and other health educators are examples of health professionals that operate from venues other than a physician's office.

Therefore, it is assumed that all respondents have come in contact at some point within the past year with a health professional. This way, they have had the opportunity to receive some sort of advice.

To minimize redundancy, the terms hypertension and high blood pressure are used interchangeably. Similarly, the terms "messages" and "pieces of advice" are used interchangeably. It is also assumed that "health professionals' advice," "prevention messages," and "lifestyle modification advice," are all synonymous terms for our independent variable, derived from five questions from the BRFSS that coincide with recommendations from the JNC-7.

Persons who answered 'yes' to the BRFSS question about being told they have high blood pressure will be referred to as the HBP group. Those who answered 'no' will be referred to as the non-HBP group.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Understanding the relationship between certain behaviors and blood pressure (BP) is important when advising patients to adopt healthy behaviors to lower their blood pressure. This review of literature includes several sections pertinent to understanding hypertension as a disease risk factor and behavioral modifications for control and maintenance of a desirable BP level. An explanation of blood pressure and its categories follows, along with the relationship of BP to many chronic diseases. Behavioral modifications researched and recommended for practice are included. To conclude the chapter, the role of health professionals regarding BP is reviewed.

Overview

Hypertension is a well-identified risk factor for heart attacks, stoke, diabetes, coronary heart disease, congestive heart failure, renal disease, and cardiovascular disease, collectively, the world's leading causes of death. Fortunately, there is consistent and reliable data showing ways to decrease BP levels through both lifestyle modifications and medications. Lifestyle modifications include: achieving a healthy body weight, consuming a healthy diet, reducing sodium intake, participating in regular exercise, and

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limiting alcohol consumption. Unfortunately, the prevalence of hypertension is rising

and, therefore, contributing to the disease burden. A critical, teachable moment about

lifestyle modifications for persons with hypertension is when they are in contact with a

health professional, whether it is at the doctor's office, a health club, or at the pharmacy.

Explanation of Blood Pressure

Blood pressure is the force that is exerted against artery walls as the heart

pumps. The top number of a BP reading is the systolic blood pressure (SBP); this is the

maximum pressure achieved as the ventricles of our heart contract and force blood out

into our bodies. The bottom number is the diastolic blood pressure (DBP); this is the

reading when the ventricles relax. Blood pressure is measured in millimeters of mercury

(mmHg).

Factors that can influence blood pressure include: blood volume (the amount

of blood in our vascular system), heart rate, stroke volume (how much blood is

discharged from the heart's left ventricle with each contraction), blood viscosity (how

thick the blood is), and peripheral resistance (the friction between blood and the walls of

the blood vessels). An increase in any of these factors will increase blood pressure

(Sheir, Butler, and Lewis 2002). The exact etiology of hypertension can not be attributed

to a single cause. The consensus is that a number of genetic and environmental factors

play a role and that individuals respond differently to the various causes (Pickering

2000).

Table 1 shows the different BP classifications as determined by *The Seventh*

Report of the Joint National Committee on Prevention, Detection, and Treatment of High

Blood Pressure (JNC-7) committee. The official classification is given based on "the

average of two or more properly measured seated BP readings on each of two or more

office visits" (Chobanian 2003).

Table 1 - Classification and Management of Blood Pressure for Adults

BP Classification	SBP (mmHg)	DBP (mmHg)	Lifestyle Modification
Normal	<120	And <80	Encourage
Prehypertension	120-139	Or 80-89	Yes
Stage 1 Hypertension	140-159	Or 90-99	Yes
Stage 2 Hypertension	≥ 160	Or ≥ 100	Yes

Note: DBP, diastolic blood pressure; SBP, systolic blood pressure. Treatment determined by highest BP category.

Normal blood pressure is classified as having a reading of less than 120

mmHg SBP and less than 80 mmHg DBP. Prehypertension, a new category, is defined as

a SBP reading of 120-139 mmHg or a DBP reading of 80-89 mmHg; they are at

increased risk for progression to hypertension. Prior to JNC-7, there was no

prehypertension category, so it is not expected that BRFSS respondents who fell into this

category in 2002 would be given lifestyle modification advice. Stage 1 hypertension is a

reading of 140-159 mmHg SBP or 90-99 mmHg DBP. Stage 2 hypertension is having a

reading of greater than or equal to 160 mmHg SBP or greater than or equal to 100 mmHg

DBP. Stages 1 and 2 are both considered HBP and in the text that follows, they will not

be distinguished separately.

Lacking any direct symptoms, hypertension causes much internal damage. If

blood pressure is high over a period of time, the left ventricle hypertrophies because it is

doing extra work. The coronary blood vessels cannot supply nutrients to the increased heart size properly, so certain parts of the heart muscle may die. Hypertension also contributes to the development of plaque in the arteries, known as atherosclerosis. Atherosclerosis not only narrows the passageway through the arteries, but tiny pieces of the plaque may break off of artery walls causing a blockage. Results of this can be a coronary embolism (heart blockage), stroke, or a blood clot in another part of the body (Sheir, Butler, and Lewis 2002).

High Blood Pressure Screening

The United States Preventive Services Task Force (USPSTF) strongly recommends that all adults aged 18 years and older be screened for HBP. This is largely due to the fact that the benefits of screening for, and possibly treating or counseling on, far outweigh the risks. This recommendation is in response to the facts that hypertension leads to increased risk for CVD, and that there is good evidence that interventions to lower BP decrease the incidence of CVD (Agency for Health Care Research and Quality – High Blood Pressure 2003). Besides USPSTF, the American Heart Association, and the American Diabetes Association support efforts to counsel on modifiable CVD risk factors, such as HBP, while patients are visiting their primary care provider (Egede 2002).

JNC-7

The JNC-7 committee was assigned the duty of providing clear, practical, and timely guidelines for physicians regarding the treatment and prevention of hypertension.

The JNC-7 recommends five lifestyle modifications for the management of hypertension (Chobanian 2003):

1. Weight Reduction (Maintain Normal Body Weight - BMI 18.5-24.9 kg/m^2)

2. Adopt Dietary Approaches to Stop Hypertension (DASH) eating plan (Consume a diet rich in fruits and vegetables, and low fat dairy products with reduced content of saturated and total fat)

3. Dietary Sodium Reduction (Reduce to no more than 1,800 mg per day)

4. Physical Activity (Engage in regular aerobic physical activity for at least 30 minutes a day on most days of the week)

5. Moderation of Alcohol Consumption (Limit consumption to no more than 2 drinks a day for most men and 1 drink a day for most women)

<u>High Blood Pressure as a Risk Factor</u>

Introduction

A disease risk factor is a factor that contributes to the probability of contracting a certain disease or condition. Modifiable risk factors (i.e. smoking, physical activity, diet) are those which we can alter by engaging in certain behaviors. Unmodifiable risk factors are those which are inherent to each individual (i.e. age, race/ethnicity, family history, sex). There is an abundance of literature that supports the hypothesis that HBP is a risk factor for a host of diseases and conditions that are not only costly, but life threatening and potentially life ending. The section to follow will highlight three of these conditions: CVD, diabetes, and metabolic syndrome.

Heart Disease

The JNC-7 reports that, "the relationship between BP and risk of CVD events is continuous, consistent, and independent of other risk factors." This means that despite other conditions a person may have, as BP levels rise, so does the chance of having some form of heart disease; the higher it rises, the higher the chance of CVD. A meta-analysis of 61 studies reported that each 20 mmHg increase in SBP or 10 mmHg in DBP doubles the risk of CVD for persons 40-70 years old in the 115/75 to 185/115 mmHg range (Lewington et al. 2002). This indicates that persons with a blood pressure considered "normal" (120/80 mmHg) need to closely monitor and maintain their blood pressure levels because BP elevations increase the chance for CVD. Conclusions have been drawn from several epidemiological studies showing that lowering blood pressure by 2 mmHg in a large population will decrease CVD incidence by 10% (Chockalingam 2000). The incidence of CVD and its associated deaths should dramatically decrease even with small changes in an individual's blood pressure (Cook et al. 1995).

Diabetes

Diabetes is the sixth leading cause of death in America (CDC 1999). Characterized by ineffective response to insulin largely due to being overweight and sedentary, diabetes incidence is rapidly growing. High blood pressure is a risk factor for diabetes largely because there is a link between HBP and being overweight. The heart of an obese person has to work extremely hard to supply blood to all parts of the body. In addition, the larger you are, the more likely the chance that your cells will become insulin resistant. Almost 60% of people with diabetes also have hypertension. There is a two to

four-fold increased risk of death from CVD in persons with diabetes (Bakris 2002; Egede 2003).

Persons with diabetes should aim to keep their BP less than 130/80 mmHg (Chobanian 2003). Bakris (2002) reports that only 11% of persons with diabetes simultaneously treated for hypertension achieved this goal. Since more than 70% of adults with diabetes visit their primary care physician regularly, it seems logical that education about the benefits of lifestyle modifications be addressed in the primary care setting (Egede and Zheng 2002).

Metabolic Syndrome

Metabolic syndrome is the name given to a clustering of different risk factors for CVD and diabetes. There are many definitions of what hazardous risk factors make up the metabolic syndrome, including ones from the World Health Organization (WHO) and the *Third Report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults* (ATP III). A widely accepted definition is still needed (Ford, Giles and Dietz 2002). Risk factors universally included in most definitions of metabolic syndrome are: high triglycerides, abdominal adiposity, low HDL-cholesterol, hypertension, and high blood glucose (specific values for each risk factor have been excluded for simplicity because of varying operational definitions). Having three or more of these conditions classifies a person as having metabolic syndrome (Ford, Giles and Dietz 2002).

If having diabetes and hypertension leads to increased chance of having of CVD, as mentioned earlier, it seems logical to assume that having a trio of the metabolic

syndrome characteristics would lead to the same conclusion. Not surprisingly, having metabolic syndrome is associated with increased prevalence of CVD, type 2 diabetes, and all-cause mortality (Lakka et al. 2002). This was shown is a large, 5-year study of middle-aged men who began the trial without CVD or diabetes.

Data from the Third National Health and Nutrition Examination Survey (NHANES III) revealed that nearly 22% of adults in the United States have metabolic syndrome according to the ATP III definition (Ford, Giles, and Dietz 2002). This means that more than one in five persons have three or more risk factors for CVD.

All of the contributing risk factors are able to be controlled for, if not managed, by implementing lifestyle modifications. A conclusion of a study by Klein, Klein, and Lee (2002) was that by lowering BMI, cholesterol, and HBP, the incidence of diabetes and CVD will likely be reduced. The JNC-7 suggests that "intensive lifestyle modification should be pursued in all individuals with the metabolic syndrome (Chobanian 2003)." Our focus from here will be on two of the contributing factors to metabolic syndrome: the condition of being overweight and having hypertension.

Behavioral Modifications for High Blood Pressure

Introduction

The JNC-7 reports several lifestyle modifications that are effective for lowering blood pressure. These include weight reduction for overweight or obese individuals, adopting the DASH diet, physical activity, and moderation of alcohol consumption (Chobanian 2003). Smoking cessation can also assist in decreasing blood pressure. All of these behaviors have been shown to be effective at not only lowering

blood pressure, but they may improve other serious disease risk factors such as lowering low-density lipoprotein (LDL) cholesterol and reducing insulin resistance and glucose intolerance in persons with diabetes or prediabetes (Chintanadilok and Lowenthal 2002).

Chintanadilok and Lowenthal (2002) report that "even mild-to-moderate elevations in blood pressure dramatically increase the risk of left ventricular hypertrophy, stroke, and renal disease." Therefore, it is reasonable to conclude that mild-to-moderate decreases in BP are protective against CVD, as shown by Chockalingham (2000) and Cook et al. (1995).

High Blood Pressure and Exercise

Several studies have been done on the relationship between exercise and blood pressure. Exercise of varying types and intensities have been examined and demonstrate decreases in both systolic and diastolic blood pressure. In a review of 54 trials, Whelton, Chin, Xin and He (2002) report that the average decrease in systolic blood pressure is 3.84 mm Hg and 2.58 mm Hg for diastolic. In an earlier meta-analysis of nine studies, Kelley and McClellan (1994) examined the effects of lower extremity aerobic exercise (stationary cycling, walking/jogging, etc…). They reported 7 ± 5 SBP and 6 ± 2 DBP mmHg decreases in resting blood pressure as a result of lower extremity aerobic exercise (Kelly and McClellan 1994).

Since patients are least likely to comply with advice to increase physical activity (Egede and Zheng 2002), it is best to tailor exercise to each individual's status and needs (Chintanadilok and Lowenthal 2002). No specific studies or guidelines have been laid out for the recommended frequency, intensity, and duration of exercise for

people with hypertension (Chintanadilok and Lowenthal 2002). However, the JNC-7, in concurrence with the Surgeon General's Guidelines on Physical Activity, recommends that patients engage in physical activity such as brisk walking for at least 30 minutes per day on most days of the week (Chobanian 2003).

High Blood Pressure and Diet

The effect of consuming a sound diet has a significant impact on lowering blood pressure. A sound diet consists of a diet rich in fruits, vegetables, low fat and low cholesterol foods, whole grains, fish, and nuts, in place of high-fat foods, red meats, and foods high in sugar and sodium.

There is conclusive evidence that a high-sodium diet is positively associated with increased BP. There is also some evidence that points toward a protective effect from potassium and calcium intake; slight decreases in BP have been linked with supplementation of potassium and calcium (Chobanian and Hill 2000). Most recently, the Institute of Medicine (IOM) has decreased the tolerable upper limit of salt intakes to 5.8 grams per day, which over three-quarters of U.S. adults exceed. IOM has raised the recommended amount of potassium, found in fresh fruits and vegetables, to 4.7 gm/day; most Americans eat only half this amount (Institute of Medicine 2004).

As a lifestyle modification, the JNC-7 recommends following the Dietary Approaches to Stop Hypertension (DASH) eating plan. Figure 1 provides a graphical representation of the DASH pyramid. Because of the nature of DASH, more fruits, vegetables, and whole grains along with less processed and other high-sodium foods are consumed. DASH supplies fiber, calcium, potassium, and less than 1,500 mg of sodium

if followed correctly. The base of the DASH pyramid is fruits and vegetables with a

recommended 8-10 servings per day. Next up is grains (preferably whole grains) with 7-

8 recommended servings per day. The third tier of the DASH pyramid is low-fat dairy

(2-3 servings per day) and seafood, poultry, and lean meat (0-2 per day). Beans, nuts,

and seeds (1 serving), oils, salad dressing, and mayonnaise (2-3 per day), and sweets (5

per week) finish off the top of the pyramid (Center for Science in the Public Interest,

2003).

Figure 1. The Dietary Approaches to Stop Hypertension (DASH) Pyramid.
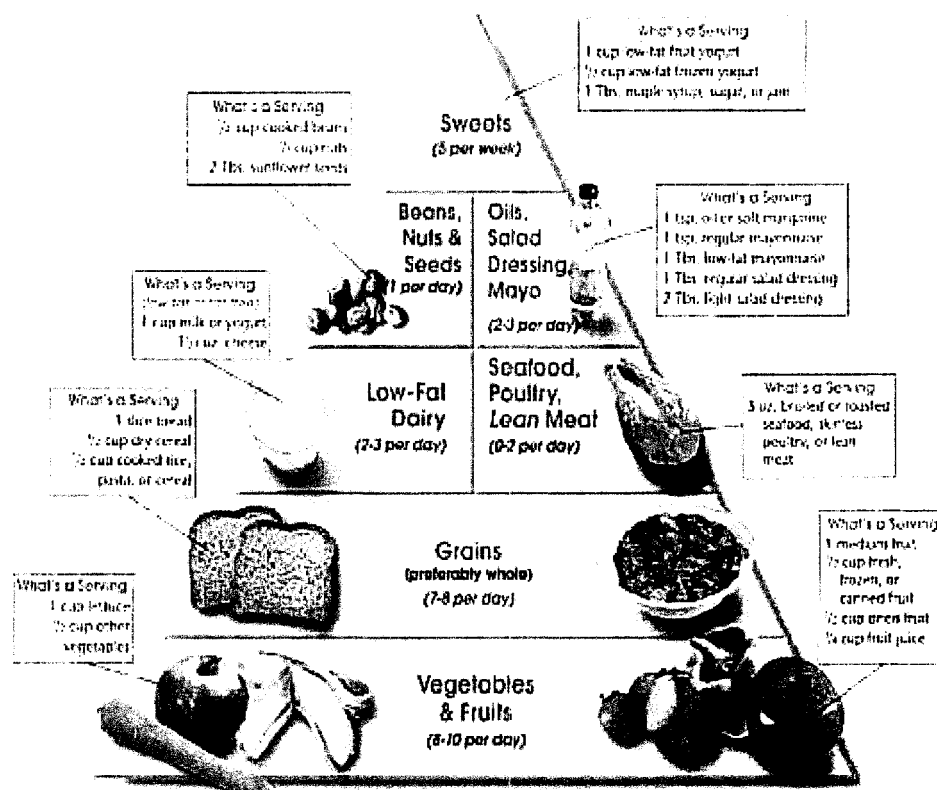
Note: Graphic courtesy of Center for Science in the Public Interest, 2003.

A meta-analysis from 58 studies (N=3000) measuring reduction in urinary sodium excretion revealed an average reduction of 4.5 mmHg SBP and 2.3 mmHg DBP (Chobanian and Hill 2000). The studies involved had varying degrees of dietary sodium restriction. The outcome measure was urinary sodium excretion which measured the degree of elimination of sodium from the diet. Similar clinical studies show consistent findings that sodium reduction has a small but significant effect on BP (Chobanian and Hill 2000).

Participants in the Trials of Hypertension Prevention (TPOP), Phase II study revealed drops in BP due to sodium reduction. At a 7-year follow-up, incidence of hypertension in the sodium reduction group was 22.4% and in the control group it was 32.9%. All participants began with a DBP of 80 to 89 mmHg and a SBP < 160 mmHg (He et al. 2000).

Based on a review of literature, the JNC-7 estimates a decrease in SBP of 2-8 mmHg by adopting a sodium-restricted diet (< 2400 mg sodium per day). By following the DASH eating plan guidelines, a decrease of 8-14 mmHg can be achieved (Chobanian 2003).

The DASH eating plan is not mentioned in the BRFSS, but there are questions related to increased fruit and vegetable consumption and decreased fat and cholesterol consumption. Since these are components of DASH, they are used to measure health professional advice on hypertension-lowering lifestyle modification related to diet.

High Blood Pressure and Weight Loss

A landmark study in 1978 was the first to show that weight loss could reduce blood pressure independent of a low-sodium diet (Reisin et al. 1978). Since then, studies with people who are overweight addressing weight loss continue to show decreases in blood pressure, but focus on other disease risk factors associated with being overweight. Adolescents who showed drops in BP after losing weight also showed associated changes in insulin sensitivity (Rocchini et al. 1987). Similarly, in adults with hypertension, there was a highly significant relationship between improved insulin sensitivity and decreases in blood pressure associated with losing weight (Su et al. 1995).

Ultimately, weight loss will likely be achieved if physical activity is increased and a sound diet is followed. These two lifestyle modifications, as discussed earlier, are the cornerstones of a successful weight loss program; thus, all of these behaviors are interrelated. The JNC-7 recommends maintaining a normal body weight (BMI 18.5-24.9 kg/m^2). It estimates a 5-20 mmHg reduction in SBP for every 10 kilograms of weight loss.

Multiple Behavioral Modifications

Prescribed separately, each of the above lifestyle modifications appears effective at decreasing in blood pressure. The PREMIER Clinical Trial assessed the effects of using these lifestyle modifications (weight loss, sodium reduction, and increased physical activity) simultaneously. A group (N=268) that received a behavioral intervention and received instruction on the DASH diet implemented the following recommendations: 1) weight loss of at least 15 lbs. (if BMI $\geq$ 25) at 6 months, 2) at least

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180 minutes per week of moderate-intensity physical activity, 3) less than 100 mEq of dietary sodium daily, and 4) less than 2 alcoholic drinks per day for men and less than 1 for women. At six-month retest, decreases of 11.1 mmHg SBP and 6.4 mmHg DBP were found. Further, other positive results occurred as a result of the intervention (weight loss, increased fitness level, increased fruit and vegetable intake). The PREMIER trial indicates that multiple lifestyle changes are effective at lowering BP (Appel et al. 2003).

Conclusion

Behaviors that foster good health and lower blood pressure are well documented. Maintaining a healthy weight through diet, exercise, and other healthy behaviors is the recommended lifestyle if one wants to achieve an optimal quality of life. Lifestyle modifications in this direction are also cost-effective due to the fact that less medication and visits to the doctor's office will be made if one strives to keep themselves in an optimal state of health. Adopting more than one healthy lifestyle change is more effective than just focusing on one, as shown by the PREMIER trial (Appel et al. 2003).

High Blood Pressure Medications

In the "*Sixth Report of the Joint National committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure* (JNC-6)", experts recommend lifestyle modifications for up to one year in persons with above-optimal BP or stage 1 hypertension (SBP 140-159 or DBP 90-99) before introducing medications (Appel, et al. 2003). In HBP patients with an additional CVD risk factor besides hypertension, six months of lifestyle modification was recommended before the introduction of medication (Appel, et al. 2003). JNC-6 was released in 1997; since then,

experts have changed their views on when to introduce pharmacological treatment. JNC-7 is much more aggressive in treating hypertension with medications, recommending immediate introduction to medication accompanied with lifestyle modifications for persons diagnosed with hypertension.

Although medications to treat HBP are not the focus of this paper, they play an important role in controlling BP levels. Lifestyle modifications, especially when used in a combination of two or more, are inexpensive and may improve other health conditions (Type II diabetes, depression, stress, arthritis, and others), but in many instances, it is crucial that optimal blood pressure levels be achieved as soon as possible.

The JNC-7 lists all of the recommended antihypertensive medications, their class, trade name, and usual dosage range as a guide (Chobanian 2003). Clinical trial data on different drugs has shown real outcomes on prevention of heart failure, stroke, and coronary disease. Evidence-based recommendations are what JNC-7 relies on, rather than complex laboratory tests and difficult staging systems for hypertension in the past (Green 2003).

Special consideration needs to be given to people who suffer from other conditions such as chronic kidney disease, diabetes, and metabolic syndrome to ensure that there are not any harmful interactions with any medications (Chobanian 2003). Choosing the right antihypertensive medication for patients is an important component in the management of HBP. However, our focus will be on how often lifestyle modification advice is given to patients.

Role of Health Professional

Introduction

Physicians play a pivotal role in influencing patient behavior. Not only are patients more apt to comply with advice if it is given to them by their physician, they are more likely to be successful (Kreuter, Chheda and Bull 2000). The facts on how often physicians actually provide advice and counsel, despite many positive outcomes, remain grim.

A study conducted on physician practices in a large Michigan healthcare system showed that physician advice to adopt healthy lifestyle changes, including smoking cessation, increasing physical activity, losing weight, and adopting a healthy diet, was given less than half of the time to persons (N=270) previously diagnosed with hypertension (*Your Guide to Living Healthier Longer* 2002). Only 38% of visits resulted in blood pressure medication being started or changed (*Your Guide* 2002).

Using BRFSS data, specifically the question: "In the past 12 months, has a doctor, nurse, or other health professional given you advice about your weight?" Galuska, Will, Serdula, and Ford (1999) conducted analysis on 12,835 obese (BMI $\geq$ 30 kg/m^2) respondents who had visited their physician in the past 12 months. Men (N=4872) and women (N=7963), 18 years old and older, provided the following information on health professionals' advice. Forty-two percent gave the response "Yes, lose weight." The rest indicated that they were not advised to lose weight. Of respondents who had been told to lose weight by their health professional, nearly three times more of them reported actually attempting to lose weight than persons who had not received advice. This indicates that 1) less than half of obese respondents (42%) are

receiving health professional advice to lose weight, and 2), of people who receive advice, they are more likely to attempt behavior change.

There are several reasons that may account for the seemingly poor job that physicians are doing. First, the structure of the U.S. health care system is set up does not allow for much one-to-one counseling between physician and patient. The Agency for Health Care Research and Quality (AHRQ) reported a mean visit to a primary care physician at 16 minutes, hardly enough time to discuss prevention techniques in depth (Agency for Health Care 1999). Second, several sources have reported that physicians have very low confidence in their patients to change behavior; they doubt whether patients will follow their recommendations and guidelines (Egede 2003). Because they doubt the ability of their patients to follow advice, physicians may target persons who they feel are 1) most likely to change and 2) those who they have increased contact with (Galuska et al. 1999). For example, in the study using BRFSS data mentioned above, obese participants who received advice were more likely to be women, have more education, be more overweight, and have diabetes than those who did not receive advice (Galuska et al. 1999); interestingly, these groups tend to visit physicians more frequently (Woodwell 1997; Fontaine et al. 1998).

This pessimistic attitude in patient adherence by physicians is very discouraging since there is literature that shows a positive correlation between receiving physician advice and recalling it later, as well as, actually making positive behavior changes. Kreuter, Chheda, and Bull (2000) showed that patients who received advice from their physician and were mailed print materials three days later to quit smoking, eat less fat, or get more exercise were more likely to recall the materials at a 3-month follow-

up compared to participants who were not given any advice. In addition, participants who received the advice from their physician, as indicated by a follow-up questionnaire mailed to participants' homes, were more likely to try to quit smoking, make diet changes, and adopt some form of physical activity (Kreuter, Chheda and Bull 2000).

A positive response to physician advice to make lifestyle modifications was shown in an analysis of 1998 data from the National Health Interview Survey (NHIS). Respondents with diabetes (N=1,609) and without (N=19,672) were asked three questions based on their adherence to a physician's advice to lose weight, increase physical activity, and take antihypertensive medications. Several findings resulted from this study. First, individuals with diabetes received significantly more advice for the three behaviors than people without diabetes. Second, adherence to the advice to lose weight and take medications was more likely in people with diabetes; advice to increase physical activity was not as effective in adherence (Egede 2003). This points out that patients with diabetes are more likely to follow physician advice. It is possible that other at-risk patients, such as those with hypertension, may follow physician advice, as well. To conclude, behavior change is effective when people receive preventive advice in their physician's office.

Physician and Patient Relationships

Communication between health care providers and patients has been studied extensively (Glanz, Rimer and Lewis 2002). There is enough research to support the most effective means for a physician to interact with their patients. Using a patient-centered communication approach where the patient is actively involved in treatment

decisions is related to better health outcomes (Adams, Smith and Ruffin 2001; Stewart 2000; Rosal et al. 2001).

The JNC-7 supports this and reminds clinicians to aid in the empowerment of patients to improve their own health. It instructs, "motivation improves when patients have positive experiences with, and trust in, the clinician. Empathy builds trust and is a potent motivator." (Chobanian 2003).

High Blood Pressure in Iowa

Incidence

The Annual Report from the 2001 Iowa BRFSS published that 25.5% of respondents reported that they had been told by their physician or other health professional that they had HBP (Shepherd 2002). The 2002 Annual Report published that 24.9% reported that they had HBP (Shepherd 2003). The national results from the 2001 BRFSS published that 25.6% of Americans reported having HBP (CDC-Cardiovascular 2003).

Healthy People 2010 (HP 2010) objective for the nation includes having the national BP incidence drop to 16%, nearly 10% less than the cases in Iowa and the U.S. for 2001 and 2002 (United States Department of Health and Human Services 2002).

The BRFSS data from Iowa in 2001 revealed that 37.3% of Iowans are overweight (BMI 25-30) and 22.5% are obese (BMI $\geq$ 30). In 2002, increases in overweight and obese people were shown; data revealed that 38.3% of Iowans are overweight and 22.9% are obese (Shepherd 2003). The national results reported that

37.2% of Americans were overweight and 21.0% were obese in 2001 (CDC -

Cardiovascular 2003), very similar to the Iowa statistics.

The HP 2010 objectives for the nation include having 60% of adults at a

healthy weight (U.S. DHHS 2000). With nearly 60% who are overweight or obese, Iowa

and the U.S. are falling short of this goal. From these similar incidence rates, it seems as

though Iowa provides a mini-snapshot of the U.S. as a nation.

BRFSS Reports on Health Professionals' Advice to Patients

The Annual Report from the 2001 Iowa BRFSS reports on how often doctors

are advising certain lifestyle modifying behaviors. In 2001, 18.7% of respondents

reported that within the past 12 months they were advised by their doctor to eat fewer

high fat and cholesterol calories. Twenty-four percent reported that their doctor advised

them to exercise more. Since around one-quarter of Iowans reported being told they have

HBP and nearly 60% being classified as overweight or obese, it seems as though the

percentages for physicians advice to engage in healthy lifestyle modifying behaviors such

as fat and cholesterol intake and exercise should be much higher.

Data from 2002 show similar results. Figure 2 shows the prevalence of

Iowans receiving advice on five areas regarding nutrition and physical activity behaviors.

All four of these areas are explored, in depth, along with smoking cessation advice for the

purpose of this study. They will be broken down by hypertension status and weight

groups later in the investigation.

**Figure 2 – Prevalence of Iowans Receiving Advice on Nutrition
and Physical Activity.**
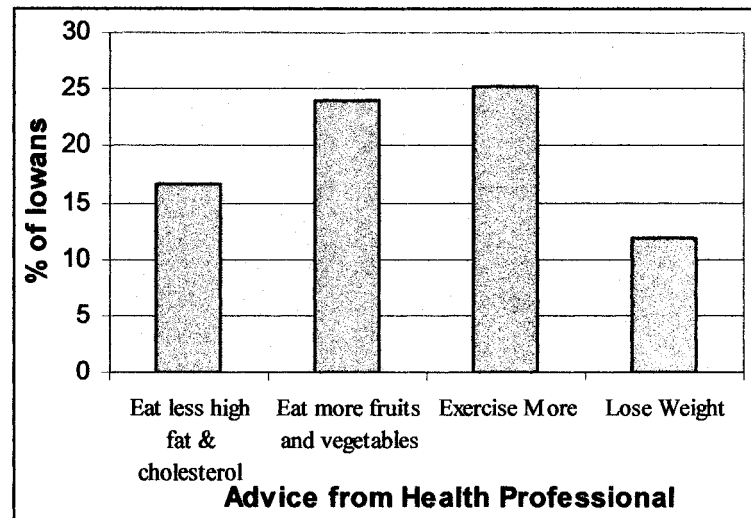
Conclusion

Because HBP is a contributor to CVD, the leading cause of death in the

United States, efforts should be made to control this risk factor. Aside from reducing the

burden of disease, medical costs associated with CVD would be reduced if the incidence

of CVD is reduced.

Research has shown that lifestyle modifications, including physical activity

(Whelton et al. 2002), diet (Chobanian and Hill, 2000), and weight loss (Reisin et al.

1978) are effective at lowering BP levels. The JNC-7 provides guidelines for physicians

on the classification, treatment, and management of BP.

Using data from the Iowa BRFSS, this study seeks to identify how often

physicians are giving advice on lifestyle modifications to persons with hypertension. In

addition, of people with hypertension, we want to examine how often normal weight

(BMI 18.5-24.9 kg/m^2) versus overweight/obese persons (BMI $\geq$ 25) receive lifestyle

modification advice.

CHAPTER III

RESEARCH METHODOLOGY

Introduction

Because the data being used for this study had already been collected by the

Centers for Disease Control (CDC) in conjunction with state health departments prior to

further analyses by the researcher, many of the subject characteristics and data collection

procedures are already known. In this chapter, the characteristics of the survey

respondents are reported, and the dependent and independent measures are explained.

Procedure is included both for data collection methods by the CDC and Iowa Department

of Public Health (IDPH), as well as procedures used by the researcher for further analysis

of data beyond what was published prior to this thesis.

The Behavioral Risk Factor Surveillance System

Overview

The BRFSS is a random-digit, cross-sectional telephone survey conducted and

supported both financially and technically, by the CDC and state health departments. The

BRFSS is conducted in all 50 states, the District of Columbia, Puerto Rico, Guam, and

the U.S. Virgin Islands. It includes questions on demographics of respondents, quality of

life, health insurance coverage, hypertension awareness, cholesterol awareness, diet and

weight control, tobacco use, HIV/AIDS questions, and other health risk behaviors that are

major contributors to illness, disability, and premature death.

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The BRFSS questionnaire has three sections: core questions, additional modules, and state-added questions. The core questions are required by all participating states and includes 18 sections: health status, health care access, exercise, fruits and vegetables, asthma, diabetes, oral health, immunization, tobacco use, alcohol consumption, seat belts, demographics, family planning, women's health, prostate cancer screening, colorectal cancer screening, HIV/AIDS, and firearms. The optional modules are developed by CDC. Iowa includes many of the optional modules. All questions utilized for this study, with the exception of demographics, were taken from the hypertension awareness, cardiovascular disease, tobacco indicators, and weight control modules (Centers for Disease Control and Prevention – BRFSS 2003).

Procedure

Data collection and recording of respondents' answers was conducted by the CDC and state health departments. Households are contacted randomly using a disproportionate stratified sampling technique. This method groups sets of 100 telephone numbers, including unlisted numbers and new subscribers. Three strata are formed consisting of nonresidential phone numbers, residential but unlisted, and residential listed numbers. Each stratum is sampled at a different rate so that completed interviews reflect the true Iowa population as best as possible. Six geographic regions, based on counties whose total populations are approximately equal are formed as well (Shepherd 2003).

Participants were randomly selected from each household called. If the person was not available, an appointment was made to complete the interview at another date and time. During the interview, a Computer Aided Telephone Interviewing (CATI)

system was used. CATI records responses directly into the computer to eliminate the need for all answers to be recorded manually. CATI also presents the questions to the interviewer and helps keep track of appointments and call-back attempts. Data recorded by CATI is edited for accuracy and completeness by PC-Edit software. The average time to complete an interview in Iowa was 21.7 minutes (Shepherd 2003).

Weighting of Data

In order to extrapolate BRFSS results to a whole population, the results must be weighted. Weighting takes into consideration the most recent census data on age, race, and gender to accurately reflect the population from the sample. Also taken into account is the probability of reaching a person in a household based on how many telephone lines there are and how many adults live in the household. A combination of the demographic factors and selection factors make up a variable that makes it possible to report on the health behavior state of a whole population (Centers for Disease Control and Prevention - Prevalence, 2003).

Uses of the BRFSS

The BRFSS has been used by individual states for multiple purposes. For example, California has used BRFSS data to monitor sun avoidance practices among non-Hispanic whites. Connecticut has assessed the effect of bicycle helmet legislation on actual helmet use by respondents. Virginia collaborated with universities to create community health profiles. BRFSS data from the District of Columbia was used to support Project WISH (Women into Staying Healthy), a breast and cervical cancer prevention program (CDC - BRFSS 2003).

Subjects

Overview

Randomly chosen non-institutionalized Iowa residents (n = 3,662) over 18 years old who completed the Behavioral Risk Factor Surveillance System (BRFSS) telephone interview in 2002 are the subjects of interest. Participants in the BRFSS are random, anonymous, and voluntary. Subjects ranged in age from 18-99 years old. All answers in this cross-sectional study are self-reported.

Respondents were broken up into two groups for analysis, those who answered "yes" (n = 1,050) to the question, "Have you been told by a doctor, nurse or other health professional that you have high blood pressure?" and those who answered "no" (n = 2,514); these two groups will be referred to as the HBP and non-HBP groups, respectively. Other responses (n = 98) that could be given were "yes, but female told only during pregnancy," "don't know," or they could refuse to answer the question. Because these people did not fall into our two groups of interest, they were excluded from analysis. Thus, the total number of people whose data was used for our purposes is 3,564.

Age

A total of 18 people from our sample responded with either "don't know" or they refused their age. They were not included in analyses using age, but were included for all other statistics. The average age of all participants was 50.6 ± 18.2 (Confidence Interval [CI] 50.0-51.2) years old. The ages ranged from 18-99 years old.

The average age of the HBP group was 61.2 ± 16.0 years (CI 60.2-62.1). The average age of the non-HBP group was 46.2 ± 17.2 years (CI 45.5-46.9). These results can be seen in Table 2.

Table 2 – Characteristics of Respondents by Hypertension Status

	All (n = 3,564)	With HBP (n = 1,050)	Without HBP (n = 2,514)	p
Mean Age (years ± S.D.)	50.6 ± 18.2	61.2 ± 16.0	46.2 ± 17.2	<0.001
Sex (male %)	41 (39-42)	38 (35-41)	42 (40-44)	0.053
Overweight/Obese % (BMI ≥ 25)	62 (60-63)	75 (72-77)	56 (54-58)	<0.001

Note: Figures in parentheses represent 95% CI. No allowances were made for missing data.

Sex

Of all respondents analyzed, 40.7% were male. In the HBP group, 38.2% were male; in the non-HBP group, 41.7% were male. Therefore, in the HBP and non-HBP groups, most respondents were female (61.8% and 58.3%, respectively). The results can be seen in Table 2.

Weight

Based on body mass index (BMI), participants were divided into two groups: a normal weight group (BMI 18.5-24.9 kg/m^2) and an overweight / obese group (BMI ≥ 25 kg/m^2). There were a number of respondents with missing height and weight data (n = 142). Similar to the age variable, missing data points were excluded in analyses using weight, but included in all others.

As reported in Table 2, 61.5% (CI 60-63) of the total number of respondents

(n = 3,422) is overweight or obese. In the HBP group (n = 998), 74.5% (CI 72-77) are

overweight or obese; in the non-HBP group (n = 2,424), 56.2% (CI 54-58) are in the

overweight / obese category. Figure 3 illustrates HBP group differences in prevalence of

overweight / obese. Of persons who indicated that they had been told that they have

HBP, approximately three-quarters (74.5%; OR 72-77)) of them are classified as

overweight or obese according to their self-reported height and weight data; this is a

significantly greater prevalence of overweight / obese respondents (p < 0.001) than the

respondents who indicated that they had not been told that they have HBP (56.2%; OR

54-58).

Figure 3 - Respondents who are Overweight / Obese (BMI ≥ 25) as a Function of Blood Pressure Group (in percentage)
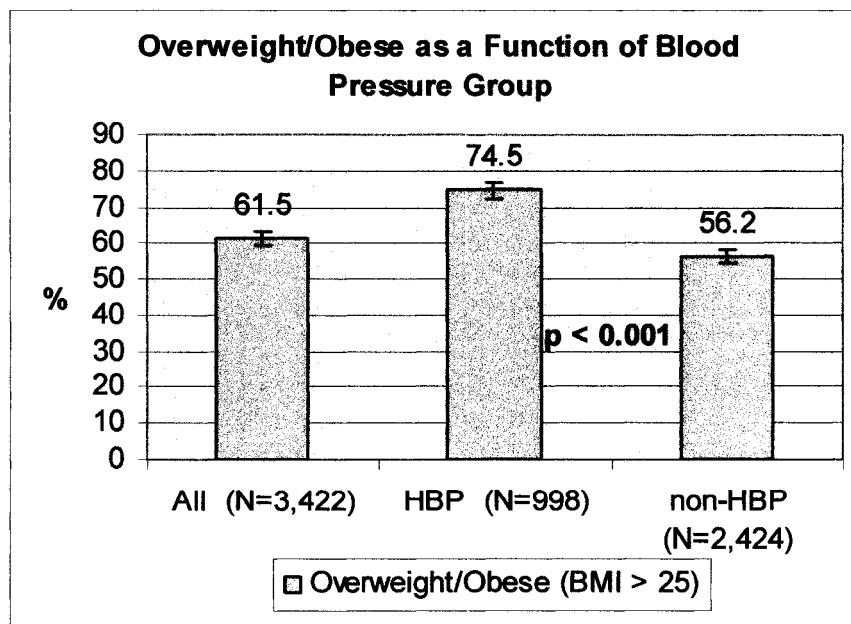
Measures

Independent

High Blood Pressure Group

Our subjects were divided into two groups. Those who answered 'yes' (n = 1,050) to the question "Have you been told by a doctor, nurse, or other health professional that you have high blood pressure?" and those who answered 'no' (n = 2,514). Respondents who answered 'yes, but female told only during pregnancy,' 'don't know,' refused, or had missing data for this question were excluded (n = 98).

Body Mass Index Category

Based on self-report height and weight data from respondents, body mass index (BMI) was calculated in kilograms over meters squared (kg/m^2). The BRFSS dataset grouped people into a normal (BMI 18.5-24.9 kg/m^2), overweight (25-30 kg/m^2), and obese category (>30 kg/m^2). To simplify data analysis and because overweight and obese individuals are all at increased risk for HBP and CVD, the overweight and obese categories were collapsed together.

Dependent

Health Professional Advice Questions

Questions from the BRFSS based on health professionals' advice to engage in health-promoting behaviors are the dependent measures. There are five questions relating to lifestyle modification advice from health professionals. Answering positively (with a 'yes') to two of the five advice questions qualifies a person as receiving advice to make lifestyle modifications.

The questions are as follows:

1) "Within the past 12 months, has a doctor, nurse, or other health professional told you to eat fewer high fat or high cholesterol foods?"

2) "Within the past 12 months, has a doctor, nurse, or other health professional told you to eat more fruits and vegetables?"

3) "Within the past 12 months, has a doctor, nurse, or other health professional told you to be more physically active?"

4) "In the past 12 months, has a doctor, nurse or other health professional given you advice about your weight?"

5) "In the past 12 months, has a doctor, nurse or other health professional advised you to quit smoking?"

For the first three questions, the respondents were considered to have received a preventive message if they answered 'yes' to each respective question.

The fourth question about weight could be answered in different ways, indicating advice to gain, maintain, or lose weight. If a respondent answered, "Yes, lose weight," they were considered to have received a preventive message on weight. It is important to note that 27 of the people advised to lose weight by a health professional did not have a BMI that classified them as overweight or obese. We have no way of knowing, however, if they had a higher BMI at the time they received advice, so they are still considered to have received a preventive message. Because of the nature of HBP, more people in this group are overweight, therefore, their chances of receiving advice to lose

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weight is greater. No allowances were made for the increased proportion of overweight / obese respondents in the HBP group.

Smokers (n = 464) were asked the question regarding advice to quit smoking. If a respondent answered 'yes,' they were considered to have received a preventive message on smoking. It is important to note that because smokers have one more risk factor than non-smoking respondents, they have the opportunity to receive advice from a health professional in one additional area, therefore increasing their chances of having received advice.

Answering positively to any two of these five questions defines a person as receiving advice on lifestyle modification from their doctor, nurse, or other health professional. The decision to use two or more of the five pieces of preventive advice as the definition for our dependent variable was made by the researcher. The rationale was that receiving one piece of preventive advice would not be enough to elicit a meaningful change from the patient. Receiving three or more pieces of advice would be much more difficult to find meaningful group differences, especially since if one is not a smoker or overweight, they are less likely to receive those two pieces of advice.

Data Analysis

Up to this point, all of the data collection was completed by the CDC and state health departments. In order to extract just that data of interest for our purposes, data from the 2002 Iowa BRFSS dataset was downloaded from www.cdc.gov/brfss. Since the BRFSS is government-funded entity, the dataset is public domain.

After only Iowa respondents and necessary variables were selected out of the much larger dataset, the data was sequestered and various analyses were performed to locate missing data points, recode certain variables for simpler analysis and interpretation, to determine group frequencies, and to run the main tests discussed below. Necessary data was selected using SAS software.

Recoding of Variables

In order to calculate whether respondents received advice for two or more of the five behavioral modifications, a variable was created from columns of each of the five advice-related questions. A dummy variable of one (1) was assigned if a person answered positively to each question. For example, if they answered the question, "In the past 12 months has your doctor, nurse, or other health professional advised you to eat more fruits and vegetables?" with a 'yes,' they received a dummy variable of one (1). If they answered with 'no,' 'don't know,' or refused, they received a dummy variable of zero (0). Another variable was created by summing the recoded advice-related variables. Rows with a sum of two, three, four, or five were classified as receiving physician advice to make health-improving lifestyle modifications.

Other recoding was preformed on original dataset variable relating to sex, BMI category, and blood pressure status. Variables were assigned solely nominal variables, zeros and ones, for simpler analysis and interpretation. Recall that the overweight and obese categories from our second independent variable, BMI group, were collapsed together. Because the recodes were done with SPSS statistical analysis software and not by hand, the outcomes were not affected by any human data entry error.

Missing Data

Certain respondents of the BRFSS were excluded. If data was missing for the question that asked, "Have you been told by a doctor, nurse or other health professional that you have high blood pressure?" or if respondents answered with 'yes, but female told only during pregnancy,' 'don't know' or 'refused,' they were excluded (n = 98).

Missing ages for respondents (n = 20) were exclude from age analysis. Persons who had missing height or weight data (n = 142) were excluded from analysis using BMI.

Most respondents answer the majority of the BRFSS questions, but refuse on a select few. Whenever possible, all answers given are analyzed to answer each research question. However, where there is a missing data point due to refusal or if they did not know how to answer a question, they were not counted on that specific variable. Because very few questions had large missing data points, no allowances were made for missing data under the assumption that the impact would be negligible.

Statistical Analysis

The first levels of statistical analyses were descriptive statistics, such as means and standard deviations for age, and frequencies for sex and weight. SPSS software was used to generate frequencies and their corresponding significance values between groups.

Next, chi square analysis was used to test the two main hypotheses. Cross tabs between the two blood pressure groups and whether or not they had received health professionals' advice were performed to test the first hypothesis. Cross tabs for normal weight and overweight / obese respondents from the high blood pressure group and

whether or not they had received health professionals' advice were performed to test the second hypothesis. Among people in the HBP group, the prevalence of normal weight (BMI 18.5-24.9 kg/m^2) and overweight/obese (BMI $\geq$ 25 kg/m^2) respondents in the state of Iowa who received advice was determined. Further chi square tests showed group differences between each individual advice question, as well.

One-way analysis of variance (ANOVA) tests were used to determine the 95% Confidence Intervals for each percentage were determined from our chi square analyses.

After the weighting was applied to the HBP and non-HBP respondents, the percentage of people in the state of Iowa receiving advice was determined. Logistic regression was used to determine any masked contributions to the results that group differences in age, weight, and sex may have had a role in.

Data was analyzed using SPSS 11.5 statistical software, and graphs were made using Microsoft Excel.

CHAPTER IV

RESULTS

Overview

The results of this investigation are presented in this chapter. The primary hypothesis regarding health professionals' advice by hypertension status and results are discussed first. Following is the secondary hypothesis regarding advice to hypertension patients by weight status and the corresponding results.

The dependent measure, health professionals' advice, is defined as receiving two or more of the five lifestyle modification messages that were asked about in the BRFSS. Results are given for this definition and are also broken down by each individual question to determine which message is given most frequently. These results are at the end of the chapter. The results in this section are weighted to represent Iowans over the age of 18 years.

### Primary Hypothesis

Blood Pressure Groups

The primary hypothesis is that individuals with HBP will receive significantly more lifestyle advice, defined as receiving two or more prevention messages from their health professional, when compared to the non-HBP group. Within the BRFSS, there are five questions that each represent a lifestyle modification advice or prevention message given

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by a health professional to a respondent. All five relate to the recommendations for

lowering blood pressure by the JNC-7 guidelines.

Figure 4 illustrates that persons in the HBP group receive significantly more

advice (p < 0.001; OR 2.4) from health professionals than those in the non-HBP group.

Of Iowans that have been told by health professionals that they have HBP within the past

year (N = 540,519), 37.4% (CI 37-38) have received health professionals' advice on

lifestyle modifications. Of Iowans reporting that they have not been told that they have

HBP (N = 1,597,584), 19.7% have received health professionals' advice.

Figure 4 - Iowans Receiving Health Professionals' Advice by Blood Pressure Group
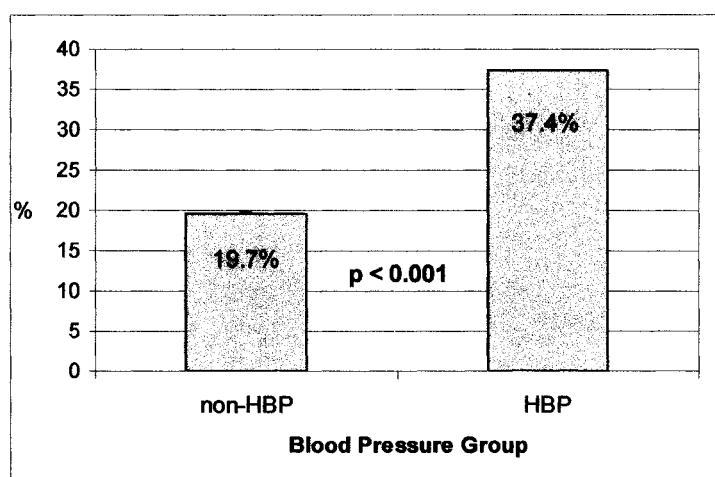
Note: Confidence Intervals about each percentage are too
small to depict graphically.

Lifestyle Modification Messages by Hypertension Status

The five health professionals' advice questions from the BRFSS that made up

the dependent variable are examined here. Although health professionals' advice was

operationally defined as receiving two or more of these individual messages, we further

explored each question separately.

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Figure 5 illustrates the differences between the HBP and non-HBP groups

regarding the amount of advice they received. Each of the bars in Figure 5 illustrates the

percentage of Iowans receiving each one of the five health professionals' advice

questions starting with advice to eat less high-fat and high-cholesterol foods at the left to

quitting smoking at the right.

For each of the five questions, the HBP group received significantly more

advice than the non-HBP group as depicted in Table 3 on the following page and Figure 5

below. The first three columns of Table 3 indicate the prevalence of each individual

piece of advice received by all Iowans, those with HBP, and those without. The number

of respondents and Iowans, respectively, are given in parentheses.

**Figure 5 – Iowans Receiving Each Lifestyle Modification Message
by Blood Pressure Group.**

Note: Confidence Intervals about each percentage are too small to
depict graphically.

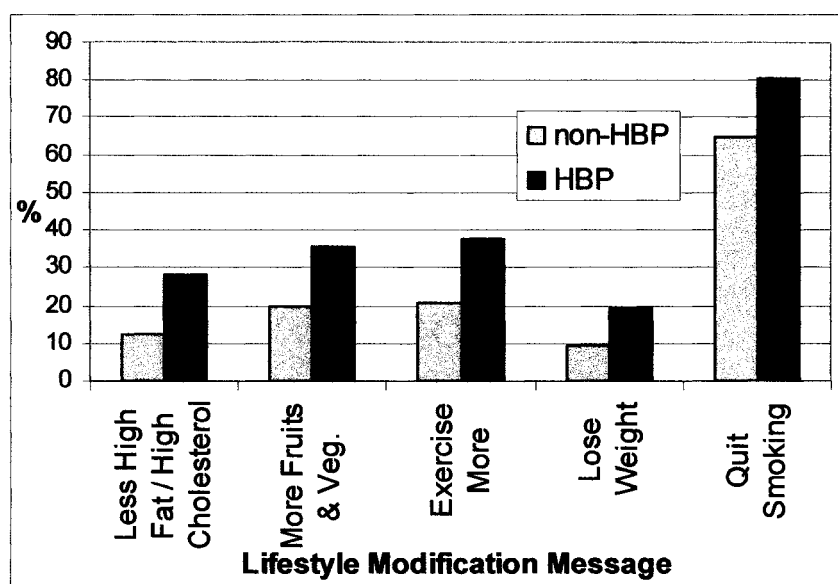**Table 3 – Individual Statements of Lifestyle Modification
Advice by Hypertension Group**

	Total Iowans (%)	HBP (%)	Non-HBP (%)	Odds Ratio (OR)	OR 95% Confidence Interval (CI)	P
Eat less high-fat / high-cholesterol foods	16.5 *(3,499; 2,098,205)*	28.3	12.5	2.75	2.73-2.77	<0.001
Eat more fruits & vegetables	24.0 *(3,495; 2,096,576)*	35.7	20.0	2.22	2.20-2.23	<0.001
Exercise More	25.1 *(3,495; 2,096,576)*	37.6	20.8	2.29	2.28-2.31	<0.001
Lose Weight	11.8 *(3,488; 2,092,548)*	19.3	9.3	2.35	2.33-2.37	<0.001
Stop Smoking	68.0 *(451; 281,723)*	80.5	64.6	2.27	2.22-2.32	<0.001
Health Professionals' Advice (2+ of the above messages)	24.1 *(3,564; 2,138,103)*	37.4	19.7	2.44	2.43-2.46	<0.001

Note: Figures in parentheses are the number of respondents and Iowans, respectively. Allowances were not made for missing data.

Secondary Hypothesis

Weight Groups

Recall that the secondary hypothesis is that of respondents stating they have

HBP, those respondents who are categorized as overweight or obese (BMI ≥ 25 kg/m^2)

will receive significantly more lifestyle advice when compared to respondents

categorized as normal weight (BMI < 25 kg/m^2).

Figure 6 shows the comparison of weight groups among Iowans with

hypertension. Of persons that indicated that they have been told that they have HBP,

those who had a BMI $\geq$ 25 kg/m^2 received significantly more advice than Iowans of

normal weight (p < 0.001; OR 1.9).

**Figure 6 – Iowans with Hypertension Receiving Health Professionals'
Advice by Weight Group.**
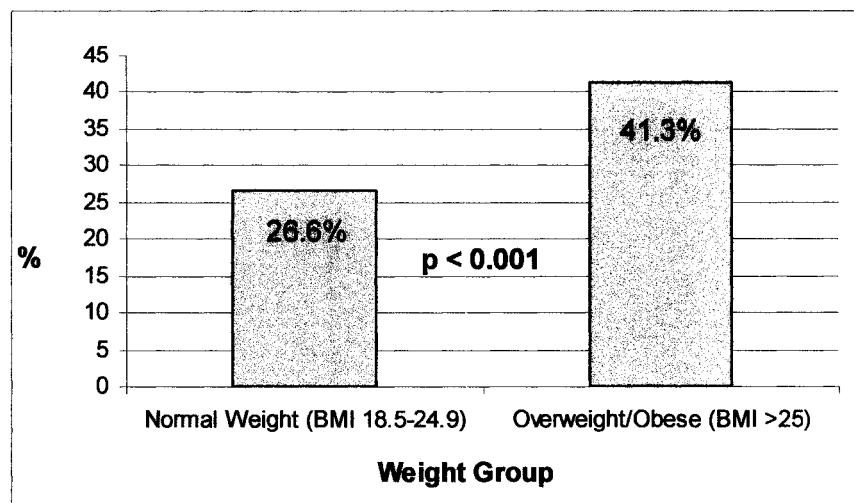
Lifestyle Modification Messages by Weight Group

Figure 7 illustrates the differences in persons indicating that they had

hypertension by weight status as a function of percentage receiving each lifestyle

modification message. In all of the cases, except for advice to quit smoking, the

overweight / obese group who have HBP received each piece of advice in a significantly

greater amount (p < 0.001, OR > 1.5) than the normal weight group who also have HBP.

Figure 7 - Iowans with Hypertension Receiving Each Lifestyle Modification Message by Weight Group.

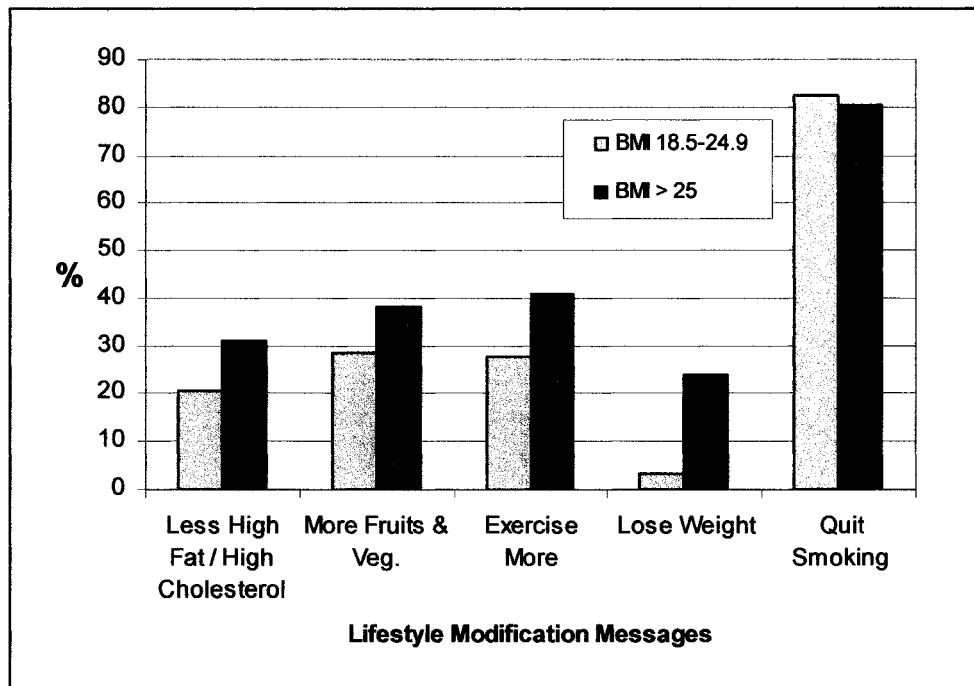Table 4 shows each individual piece of lifestyle modification advice that could have been given along with the corresponding prevalence of receiving advice for each weight group. Table 4 coincides with the secondary hypothesis, so differences between normal weight Iowans who indicated that they have hypertension and overweight / obese Iowans who indicated that they have hypertension are compared.

Table 4 – Individual Statements of Lifestyle Modification Advice in Iowans with Hypertension by Weight Group

	All HBP Respondents (%)	Normal BMI < 25 (%)	Over/Obese BMI ≥ 25 (%)	Odds Ratio (OR)	*P*
Eat less high fat / high cholesterol foods	28.6	20.5	31.0	1.74	<0.001
Eat more fruits & vegetables	36.2	28.8	38.3	1.54	<0.001
Exercise More	38.0	27.7	41.0	1.81	<0.001
Lose Weight	19.3	3.4	24.0	9.01	<0.001
Stop Smoking	80.9	82.5	80.5	0.86	<0.001
Health Professionals' Advice (2+ of the above messages)	37.9	26.6	41.3	1.93	<0.001

Note: Group Ns were omitted for clarity. Stop Smoking advice is significant in opposite direction of others; normal weight received cessation advice more advice. No adjustments were made for missing data.

Frequency of Individual Lifestyle Modification Messages Given

Each respondent was asked if they had received advice from their "doctor, nurse, or other health professional" regarding a specific lifestyle modification message. There were five questions; therefore, respondents could have received zero, one, two, three, four, or five statements of advice.

Regarding the question on advice to quit smoking, only smokers (n = 464) were asked, so they have an extra opportunity to gain a piece of advice. Figure 8 shows the frequency of messages received by hypertension group.

Respondents who have not been told that they have HBP received no pieces of advice more often than those with HBP, 65.0% vs. 46.6%, respectively. The HBP respondents received one piece of advice (16.0% vs. 15.3%), two pieces of advice (12.4% vs. 8.9%), three pieces of advice (13.8% vs. 6.1%), four pieces of advice (10.3% vs. 4.3%), and all five pieces of advice (0.9% vs. 0.3%) more often than the non-HBP respondents.

Figure 8 – Frequency of Messages Received by Iowans with Hypertension and without Hypertension.
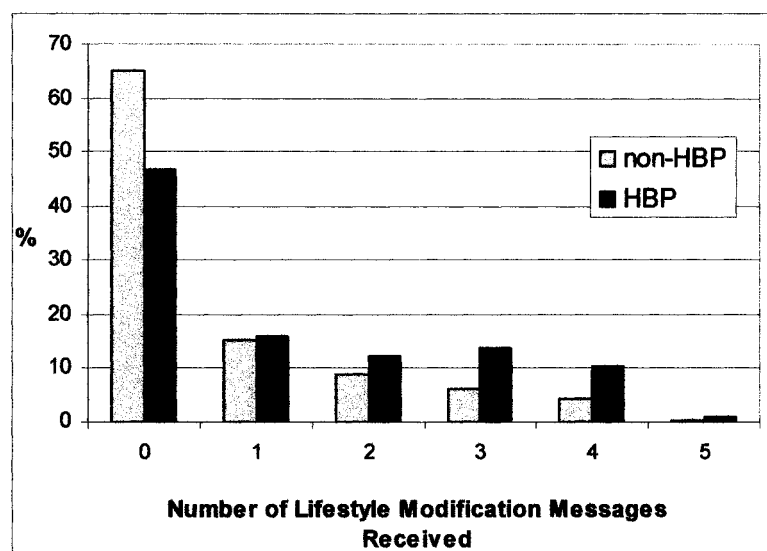
Of Iowans without HBP, the average number of messages received (of five) was 0.7 ± 1.2 pieces of advice. Of Iowans indicating that they had been told they have HBP, the average number of advices received was 1.3 ± 1.5 pieces of advice.

Similarly, the frequency of advices given can be broken down by weight group among just the people with hypertension. Examine the differences in frequency of advices given to normal weight and overweight / obese Iowans in Figure 9.

Of all of the HBP respondents, those that fall into the normal weight category

have a greater prevalence of having received zero pieces of advice (57.2% vs. 42.3%)

than those classified as overweight or obese. As was the case with observing differences

between BP groups, the overweight / obese respondents with HBP receive one, two,

three, four, and five statements of advice more often than their normal weight

counterparts.

Figure 9 – Frequency of Messages Received Among Hypertension Patients in Iowa by Weight Group
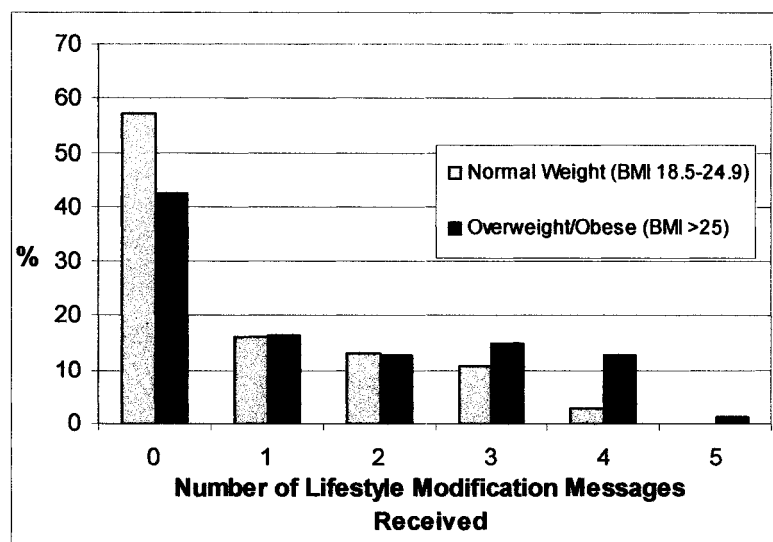
Regression Analysis

While the findings are consistent with what the hypotheses predicted, the

possibility still exists for some factor other than hypertension status or weight group to be

the main predictor of whether or not a person receives advice or not. Recall from the

previous chapter that the HBP group differed from the non-HBP group in age, weight,

and sex. Persons with HBP tend to be older, heavier, and more often female, on average.

The effect of any one of these confounding variables could have been masked, had further testing by way of regression analysis not been performed. It is possible that if advice is given to older people more often, regardless of hypertension status, our HBP group will automatically receive more advice.

To strengthen support for the hypothesis, regression analysis did reveal that BP status is the best predictor of whether or not a person receives advice. This way, one can be confident that the extent of the effect of any other variables on our results is negligible.

Conclusion

In the results reported in the text above, both hypotheses were strongly supported. Looking at the individual advice questions provides insight into which messages are given to Iowans by health professionals most often.

CHAPTER V

DISCUSSION

Overview

In examining the 2002 BRFSS data, the prevalence of Iowans receiving lifestyle modification advice from health professionals was explored. In this chapter, the results of the two main hypotheses will be interpreted and their importance will be discussed. The two main hypotheses are supported, showing that persons with a CVD risk factor, namely hypertension and being overweight, do receive more advice to lower their risk. Observing the individual questions that make up the dependent variable provide insights that are worth discussing in relation to our main aims. The blame for low prevalence of prevention advice should not fall solely on the shoulders of physicians and other health professionals. Several reasons for low reports of receiving lifestyle modification advice and possible solutions to the problem are addressed. Finally, ideas for expansion of the current information by future researchers are included.

Interpretation of Results

Demographics

Before delving into the main aims of the paper, some interpretation of the characteristics of the respondents is necessary. People who have hypertension have the

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tendency to be older (Shepherd 2003) and heavier, on average. This was the case with Iowa respondents, as well. Respondents with HBP were significantly more overweight / obese ($p < 0.001$) and older ($p < 0.001$). However, respondents did not vary significantly by sex ($p = 0.053$). Despite the differences between groups, regression analysis shows that hypertension status is the best predictor of whether or not someone will receive advice, not age or weight status.

Primary Hypothesis

The primary aim was examined and overwhelmingly supported, as shown in the results section. The results showed that persons stating they had been told that they have HBP did indeed receive more messages (37.4%) from health professionals than those who did not have HBP (19.7%). The odds ratio (OR) of 2.4 and extremely small confidence intervals (CI) about these prevalence rates, indicate that there is little doubt that health professionals recognize that hypertension is a risk factor for CVD and therefore advise more.

The fact that only slightly over one-third of the 1,050 respondents with HBP received two or more messages of five is of concern. Discussion of why there is a seemingly low prevalence of BP-lowering advice and some possible solutions are discussed further.

Secondary Hypothesis

The secondary aim was found to be significant, as shown in the results section. Of persons with HBP, those who are classified as being overweight or obese received more statements of advice (41.3%) than did their normal weight counterpart

(26.6%). Recall that of all HBP respondents, 37.4% received advice (>2 pieces of lifestyle modification advice). It is not surprising that the addition of another risk factor, overweight / obesity, increases the prevalence of advice that is given (OR 1.9).

Lifestyle Modification Messages

Until this point, "advice" has been defined as receiving two or more of the five lifestyle modification messages from a health professional. To probe deeper into the dependent variable, each individual lifestyle modification message may provide insight as to what the most and least prevalent messages given were.

To review, each respondent was asked, "In the past 12 months has a doctor, nurse, or other health professional advised you to:

1) eat fewer high fat or high cholesterol foods?"

2) eat more fruits and vegetables?"

3) be more physically active?"

4) lose weight?"

5) quit smoking?"

Table 5 shows the prevalence of each piece of lifestyle modification advice received by BP group, previously reported in the results section. All pieces of advice were received most often in Iowans with HBP compared to Iowans without HBP.

Table 5 – Prevalence of Advice Given by Blood Pressure Group

	HBP (%)	non-HBP (%)
Lose Weight	19.3	9.3
Less fat / cholesterol	28.3	12.5
More fruits & vegetables	35.7	20.0
Exercise More	37.6	20.8
Stop Smoking	80.5	64.6

Note: All differences are significant at $p < 0.001$ and
$OR > 2.0$. No allowances made for missing data.

It is not difficult to see that there are obvious differences in the prevalence of

the various pieces of advice that could be given. Advice from health professionals

regarding losing weight was given the least amount of time. The prevalence of

overweight and obese Iowans is 61.2%, yet as a whole, only 11.9% of respondents

reported being told by a health professional to lose weight. Since more overweight or

obese people are in the HBP group (75%) than the non-HBP group (56%), advice to lose

weight is given more often to Iowans with hypertension versus those without (19.3% vs.

9.3%, respectively); however, the prevalence of advice given is not near the prevalence of

overweight and obese people.

Physical activity and nutrition advice (eating less high fat/cholesterol foods

and eating more fruits and vegetables) were low, as well. Since we know that aerobic

exercise and a lower-sodium diet assist in the reduction of blood pressure, a better

situation would be that most people who have been told that they have hypertension

receive some form of advice relating to exercising more, increasing fruits and vegetables,

or lowering high-fat and high-cholesterol food intake. With prevalence of these messages being given to Iowans with HBP ranging from 28.3% for eating less fat and cholesterol and 37.6% for exercising more, not even half of persons with HBP are receiving physical activity or nutrition advice, as it is asked about in the BRFSS. Refer to Table 5 to view differences in each piece of advice by BP group.

While the findings support that Iowans with risk factors receive more advice, they discouragingly point toward the fact that not nearly enough of these at-risk people are receiving advice.

Smoking cessation advice is at the other end of the spectrum. Of smokers, 68% of the total respondents reported being advised to quit and 80.5% of smokers with HBP. This is a good example of physicians and other health professionals translating research into practice, showing that health professionals recognize smoking cessation as a means to lower BP. Translation of research into practice (TRIP) is discussed next.

Translation of Research into Practice

About TRIP

TRIP seeks to improve the outcomes of care by funding research studies and building partnerships between health care organizations and researchers. There is often a time delay after original research relating to a subject such as advising on hypertension-lowering behaviors is published and when it is actually put into practice (Agency for Health Care Research and Quality -Translating 2003).

Practitioners are bombarded with clinical guidelines from a wide range of organizations. No doubt, research messages are getting to physicians, but are they

actually being practiced? Currently, funding for TRIP activities is going towards developing and testing interventions that facilitate and encourage the adoption of researched guidelines. As part of the National Heart, Lung, and Blood Institute's (NHLBI) strategic plan (NHLBI 2003), monies are being awarded to researchers willing to test the best TRIP methods.

Smoking as an Example

As shown in the results, health professionals are far more likely to counsel patients who smoke to stop smoking than they are to counsel people with hypertension on other healthy lifestyle behaviors. The TRIP for the behavior of smoking has been a success by health promotion standards, but it was not a rapid process.

Smoking trends began a steady decline in 1964 with the 1st Surgeon General's Report. Decade by decade, small steps built a strong case for why health professionals should advise people to quit smoking. In the 1960s, over 45% of the population was smokers. In the 1990s, the prevalence hovered around 25%.

Convincing evidence by researchers, warnings, and reports from the Surgeon General, policies such as cigarette taxes and smoking bans and reimbursement from insurance companies for smoking cessation tools have collectively played a role in the incidence and prevalence of smoking declining over the past four decades.

Frequency of Statements of Advice Received

Because there are five messages that relate to recommendations to lower BP, it is valuable to look at what the breakdown is of how many pieces of advice are being given out to each patient. Because there are five pieces of advice that can be given, the

possibility exists to receive zero, one, two, three, four, or all five messages. Table 6

shows the frequency of messages received by Iowans with and without hypertension; it

coincides with Figure 8 from the results section.

Table 6. Frequency of Messages Received by Iowans with Hypertension and without Hypertension.

Number of messages received	HBP (%)	Non-HBP (%)
0	46.6	65.0
1	16.0	15.3
2	12.4	8.9
3	13.8	6.1
4	10.3	4.3
5	0.9	0.3

Table 6 shows us that Iowans without HBP are more likely to have received

no messages at all regarding the five lifestyle modifications of interest. The prevalence

of the HBP and non-HBP group receiving 1 piece of advice was relatively even.

Supporting the results of persons with hypertension receiving more advice, the HBP

group received two, three, four, and five pieces of advice in greater amounts than the

non-HBP group. Recall from our primary hypothesis that 37.4% of people with HBP had

received two or more messages and fewer than 20% of people without HBP had received

the same amount of advice.

The shift in which group receives more pieces of advice occurs between zero

and one message, with the large difference in frequency of messages received occurring

at two pieces of advice. The mean number of messages received among Iowans without HBP was 0.7 ± 1.2 pieces of advice. Of Iowans indicating that they have HBP, 1.3 ± 1.5 pieces of advice was the average number of statements of advice received.

Prior to analysis, the operational definition of the dependent variable, "two or more pieces of advice," was defined. This is a fair assignment of frequency of pieces of advice that could have been given. Had the operational definition been that health professionals' advice was "one piece of lifestyle modification advice," the case may not have been as strong since it would be hard to conclude that receiving only one message was due to the condition of having HBP. Additionally, coupling lifestyle modifications together shows more positive results (Appel et al. 2003). Operationally defining health professionals' advice as receiving "three or more" or "four or more pieces of advice" may not have produced the large amount of significance that resulted from the current definition of the dependent variable. Additionally, only smokers were asked the question regarding advice to quit smoking, and it is unlikely that a person who is not overweight would be given advice to lose weight. This only leaves three messages to be received by non-smoking, normal weight respondents in order to be classified as receiving "health professionals' advice" by the present definition; they would need to have received the three pieces of advice on physical activity and nutrition as asked by the BRFSS.

Contributions to the Literature

Researchers use national datasets such as the BRFSS so that a large sample can be looked at, making the results easier to project onto a whole population. Analyzing the prevalence of individuals who are at-risk for chronic disease, especially those with

multiple risk factors and how often they receive health professionals' advice is not something that is unique to the present study. In addition, tracking how the implementation of national guidelines has been looked at previously (Galuska 1999) will be discussed below.

When national guidelines, such as JNC-7, are released, researchers ultimately want to know what the outcomes are. Using JNC-7, the ultimate goal is to have BP levels decline. There are different levels that can be observed in this process. First, guidelines are produced by experts who digest the research. After implementation and dissemination of the guidelines, how often they are being used can be tracked (i.e. Are health professionals aware that they exist? Are health professionals giving the advice to patients?). Finally, of people receiving advice, are the outcomes improving (i.e. Are people adhering to the advice? Are BP levels declining?) There are some parallels that can be drawn and conclusions that can be made by using the present study as a small but important piece that makes a contribution to a much larger puzzle.

Diabetes, similar to hypertension, is a leading cause of CVD. It can be controlled in many of the same ways as hypertension. Egede (2003) analyzed data from the 1998 National Health Interview Survey (NHIS) with the objective of determining the effectiveness of physician advice on hypertension-related lifestyle modifications in individuals with diabetes. Similar to the results presented here, Egede found that individuals with diabetes were more likely to receive advice on weight loss, physical activity, and to take medications. Furthermore, adherence to advice was greater in people with diabetes, but advice on physical activity did not seem as effective, as people did not indicate that they were exercising more.

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The present study and Egede have shown that persons with hypertension or diabetes, respectively, receive advice in a greater amount than their counterparts who do not have a condition considered a strong indicator of CVD. With the possible exception of advice to be more physically active, patients who receive advice are more likely to adopt the healthy behavior. At a three-month follow-up, participants who received advice from their physician to quit smoking, make diet changes, and adopt some form of physical activity indicated most often that they had attempted to make the changes (Kreuter, Chheda, and Bull 2000). Health professionals should be reminded of the statement that in order for at-risk people to adhere to advice, they must receive it from their health professional in the first place.

Persons who have diabetes who responded to a large survey report receiving significantly more advice than the non-diabetes respondents (Egede 2003). Now, the same can also be said for persons who report being told that they have hypertension as part of a large, national survey, thus broadening the literature on advice given to at-risk patients.

Galuska (1999) looked at obese (BMI $\geq$ 30 kg/m^2) BRFSS respondents prior to national guidelines on obesity being released. The *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults* were released by the National Institutes of Health (NIH) in 1998, and the data used was from 1996. Similarly, the JNC-7 was released in 2003, and the present study looks at 2002 BRFSS data. These baseline studies are valuable to measure change after the release of each set of national guidelines.

The main outcome measure in the Galuska study was reported advice from a health professional to lose weight and reported attempts to lose weight. Forty-two percent reported that they had been advised to lose weight; they were nearly three times more likely to report actually attempting to lose weight. Additionally, persons with diabetes were significantly more likely to receive advice than their obese-only counterparts, showing recognition of multiple risk factors.

Parallels can be drawn between the Galuska study and the present. First, most of the respondents (since they were all obese) should have received some sort of advice to lose weight since they are at increased risk for HBP and CVD. Both studies showed that some respondents with a risk factor (obesity or HBP) received advice; forty-two percent of obese respondents indicating that they had received advice to lose weight leaves much room for improvement on the part of health professionals giving out advice. Positively, multiple risk factors (obesity and diabetes) were recognized and, therefore, advised more, as in our data (hypertension and overweight/obesity). Both sets of results suggest that health professionals recognize multiple risk factors and advise accordingly, but more still needs to be done. Both researchers agree that there are many barriers to giving advice and potential flaws in the health care system.

Barriers to Offering Lifestyle Modification Advice

Overview

Despite the fact that respondents with HBP receive advice significantly more than those without, the prevalence of Iowans with HBP receiving advice is still only around one-third. The JNC-7 predicts drops in BP, especially SBP, by following several

recommendations that are similar to the statements of health professionals' advice that can be tracked using the BRFSS.

Although the JNC-7 was not released until 2003, after all data for the 2002 BRFSS had been collected, the research linking these behaviors and blood pressure was well established. It seems logical and ethical that a health professional should share this knowledge with nearly all of HBP patients they come in contact with. Following are some reasons of why prevalence of advice given on physical activity, nutrition, and weight loss remains low.

<div align="center">Lack of Knowledge</div>

Introduction

Certainly, all physicians and other health professionals do not lack the knowledge and skills necessary to perform their job. However, many have not been properly trained in offering lifestyle modification advice to patients; therefore lack of knowledge can be considered a barrier to receiving advice.

Guidelines

Physicians' offices are bombarded with clinical guidelines from various agencies. Each group has the best interests of the patient in mind, but it may be difficult for physicians and other health professionals to keep abreast of the most current and credible information. As new diagnostic tests and the number of research studies that indicate that a new preventive service should be offered emerge, the list of things to remember to counsel on grows.

Nutrition Education

Most medical school curriculums do not require a class devoted to nutrition. Often, a single lecture is the only nutrition education a student will receive while in medical school unless a nutrition elective is chosen. Medical schools recognize that nutrition is an important part of students' education, but many lack nutrition faculty (Cooksey et al. 2000). It is no wonder advice on nutrition is low. Research shows that by empowering physicians with knowledge on a certain topic, they are more likely to advise on it. Additionally, of those receiving advice, they are more likely to recall and be engaging in the advice (Pelto et al. 2004).

The recommendations of the JNC-7 advise a low-fat, low-sodium diet rich in fruits, vegetables, and fiber found in the DASH eating plan. High-protein diets are the current fad among dieters; this leaves little room for the eating habits recommended by DASH. Because of the controversy over which eating philosophy is best, nutrition counseling is a topic often neglected by health professionals.

Weight Loss

With the prevalence of obesity in the U.S. reaching epidemic proportions, Americans are seeking quick fixes for their weight problems. Similar to nutrition, the social norms for losing weight or attempting to lose weight are not necessarily in line with recommendations. The JNC-7 recommends achieving a healthy weight for persons with hypertension, but does not give clear guidelines for health professionals on how to engage a patient in a safe weight loss program. The notion of eating less and exercising more in order to expend more calories than you consume is a complex series of

behaviors. Certain health professionals may not possess the tools to counsel on weight loss.

Physical Activity

With a lack of support from literature for adherence to advice on physical activity (Egede 2003), health professionals often doubt the ability of patient to follow advice (Galuska et al. 1999).

There are many types of physical activity (walking, jogging, swimming, etc.), varying preferences for certain activities, and different components to physical fitness (flexibility, cardiovascular endurance, muscle strength, muscle endurance, etc.). This makes recommendations difficult to disseminate and advise on the part of health professionals and difficult to receive and understand on the part of recipients.

Interestingly, the U.S. Preventive Services Task Force (USPSTF) has given counseling on physical activity a rank of 'A', meaning that this service is among the most often delivered by primary care physicians (Yarnall et al. 2003). With only 25.2% of Iowans receiving advice to exercise more, it is discouraging that physical activity counseling is ranked an 'A' preventive service, meaning that physicians indicate they give out this preventive advice most often (Yarnall et al. 2003).

Health Care System Design

Lack of Reimbursement

Physicians and other health professionals, often paid on a fee-for-service basis, are inadequately reimbursed from insurance companies for providing preventive

services such as physical activity and nutrition counseling. Depending on patient visits to determine salary, it is not surprising that high-volume physicians perform fewer preventive services (Zyzanski et al. 1998).

Time

From the barriers discussed above regarding nutrition, weight loss, and physical activity, it becomes apparent that there is simply not enough time in one visit to the doctor's office to receive advice on all of these lifestyle modifications. According to the Agency for Health Care Research and Quality (AHRQ), 16 minutes is the average time spent in a primary care physician's office (Agency for Health Care 1999). An estimated 3.5 minutes of time per patient per year is used for chronic disease prevention counseling (Rafferty 1998).

The USPSTF has come up with estimates for how long various prevention services take. Counseling on regular physical activity takes 4 minutes, and counseling to limit fat and cholesterol takes 8.2 minutes. Just these two behaviors alone account for 329 working hours in a year (Yarnall et al. 2003). The way our health care system is designed does not allow enough time for preventive services to be provided by primary care physicians. In addition, physicians usually have the responsibility to provide care for an immediate medical problem if a patient is in their office. This makes the long-term goal of preventing CVD a lesser priority during that visit.

<u>Solutions to Barriers of Offering Preventive Advice</u>

Overview

The previous statistics from the USPSTF focus on chronic disease prevention originating in the physicians office. Their conclusions suggest that medical doctors are too busy treating illness to be promoting wellness (Yarnall et al. 2003). It is very easy to point a finger at practicing physicians and other health professionals for the lack of preventive advice being given. The blame that should be put on the design of our health care system in general, it should not fall on the shoulders of our medical doctors and other health professionals.

Fortunately, health professionals and policy makers are beginning to recognize all of these barriers, the first step towards changing. Below, we will use the example of smoking policy to see that it is a slow and steady progression to achieving a full adoption of a new behavior. It is the position of the researcher that the following solutions are in infancy and will gradually become mainstream practices for giving prevention messages to patients.

Referrals to other Health Professionals

There are many professionals trained to provide counseling on lifestyle modifications such as increasing physical activity, improving nutrition, and smoking cessation. Certified health education specialists, dieticians, and registered nurses are just a few allied health professional that may be better equipped than physicians, often being trained in theories of behavior change and counseling techniques.

Setting up a system where a physician, who does not have the time to provide nutrition, exercise, weight loss, or smoking cessation information to a patient, can refer to a trained allied health professional is ideal. Insurance companies might work with allied health professionals so that 1) the cost of referral is not a huge economic burden to insurance companies, 2) the patient receives quality, preventive care, and 3) the allied health professional is reimbursed accordingly.

A team or network of health professionals working synergistically under one roof seems to be a good environment for this to happen in. The barriers of making a new appointment time and traveling to another location would be removed for the patient.

Research shows that patient-centered counseling increases long-term dietary adherence (Rosal et al. 2001). By providing this service, many of the nutritional contributing factors to hypertension, obesity, and, therefore, CVD, can be reduced.

Nutrition Education to Physicians

A case has been made that physicians lack the time to spend a significant amount of time on counseling. However, research shows that if physicians receive a simple protocol on nutrition counseling, they deliver more extensive advice more often (Pelto et al. 2004). This is a good example of why medical school curricula should have a mandatory nutrition class in place for students. Some schools have tested a non-traditional approach and introduced multimedia programs to teach nutrition (Kolasa et al. 1997). We are moving from a society where infectious disease is prevalent to a predominately chronic disease dominated society; our physicians should be well equipped with knowledge to field patient questions regarding their conditions.

CHAPTER VI

RECOMMENDATIONS

Overview

There are many contributing factors to the rising numbers of death and illness due to chronic disease across America and the world. The present paper has chosen to focus on just one risk factor for CVD, hypertension, and an additional health hazard often accompanied with it, overweight and obesity. The population chosen, adult Iowans, is a relatively small slice of the demographics of the entire globe. It is the position of the author that Iowa provides a relatively accurate mini-snapshot of the United States as a whole since disease incidence rates (CVD, hypertension, and obesity) are extremely close for the two. Therefore, the following recommendations should not be generalized to Iowa.

Summary

Iowans who self-report that they have been told in the past year by a "doctor, nurse, or other health professional" that they have high blood pressure receive more advice on lifestyle modifications (>2 of the five pieces of advice from the BRFSS) than Iowans who indicate that they have not been told that they have HBP ($p<0.001$; OR 2.4).

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fat/high-cholesterol foods, 2.22 for more fruits and vegetables, 2.29 to be more physically active, 2.35 to lose weight, and 2.27 to quit smoking).

Although the at-risk group of Iowans with HBP were recognized and therefore advised more, prevalence of receipt of advice received was low with the exception of smoking. Emphasis was given to the fact that over the course of the past four decades, environmental and policy changes have collectively played a role in the incidence and prevalence of smoking declining. Through future research and a continued push for creative ways to translate research into practice, the same positive changes may be seen for other healthy lifestyle modifications. With continued baby-steps through political and environmental supports, the prevalence of overweight and obesity may decline, and the prevalence of adults engaging in physical activity and healthy eating habits may increase.

<u>Future Research</u>

Introduction

In order to expand our knowledge in the area of hypertension, how it relates to CVD and other diseases, and what can be done to maintain and lower BP, future research is recommended. Every contribution to the current knowledge base, no matter how small, should have the ultimate goal of providing insight into the best ways to reduce the burden of chronic disease.

Complex behavior changes

The lifestyle modification recommendations of the JNC-7 for people with hypertension and prehypertension are clear. These behaviors (weight reduction, adoption of DASH diet, dietary sodium reduction, increase in physical activity, and moderation of

alcohol consumption) have been strongly linked by research to lowering BP levels. We

possess the knowledge of the correlation between behavior and disease, but have yet to

find the best ways to encourage people to adopt these behaviors. More research in the

area of TRIP for complex behaviors such as adopting an exercise program, eating a sound

diet following DASH recommendations, and losing weight is necessary. Few people will

argue that losing weight is a good thing for people who are overweight, but when

debating how one should go about losing weight, many theories exist.

Adoption of these healthful behaviors can be difficult, and maintaining them

over the long term is very difficult. Strategies to develop and test the best interventions

are the goals of current TRIP research. Including linkages of beliefs, attitudes, and

values is a critical acknowledgement that should be made when devising behavior change

plans. Tapping into the environment in which people live, their social support systems,

infrastructure of the their communities, resources, and even climates in which they live,

are additional things to consider when forming models for behavior change.

Utilize existing data

Data that has been collected with monies allocated from the government is

public domain; other researchers are encouraged to use this existing data. The BRFSS,

used for this study, could answer thousands of questions relating to health risk behaviors,

but many collected data points go largely untouched. Various trends can be tracked over

time (perceived quality of life, physical activity behaviors, seat belt usage, etc...) and

broken down by various factors relating to income, education, ethnicity, geographical

area, age, sex, and the list goes on and on.

Relatively easy to use and free, this is a project that many graduate students or researchers who are looking to expand their research base and gain experience working with large datasets should consider. Additionally, questions answered from using a large national dataset can contribute to and lend support to smaller-scale studies.

More specifically, a valuable contribution to the present study would be to replicate the study design with 2003 and 2004 data. Since the JNC-7 guidelines were released midway through 2003, the initial buzz about the release amongst health professionals may have sparked high occurrences of advice giving. In 2004, an increase in pieces of advice given could point to the fact that the guidelines served their intended purpose, or, conversely, if there was a decrease in statements of advice given they did not serve their intended purpose.

Referrals to Allied Health Professionals

Due to the fact that most Iowans, even those with hypertension, report not receiving various pieces of advice from a health professional (with the exception of smoking), this is indicative of some type of breakdown in the healthcare system. It is recommended that organized groups of various allied health professionals continue to lobby for reimbursement from insurance companies for their services. It is also recommended that alliances be made with doctor's offices to facilitate easy referral. Time was shown to be a barrier to preventive care, but if someone besides the physician can give the advice, than it is possible that more people will report receiving advice from a health professional.

Other Mediums for Health Advice

Included in NHLBI's strategic plan for 2003-2007 is the action of exploring the role of media in disease and risk prevention. Using sources of information besides health professionals is another way to disseminate information. If one never comes in contact with a health professional in person, they may never hear prevention messages unless other options are utilized. Additionally, using mass media can be tailored to specific populations of people. The NHLBI proposed action includes using the plots of popular radio and television shows and the dialogue between characters to convey health advice.

Conclusion

Much of the discussion has focused on the low prevalence of advice by health professionals in regards to giving Iowans messages relating to hypertension-lowering lifestyle modifications. One must not forget that persons with hypertension are receiving advice in significantly greater amount than those without, recognizing the importance of advising at-risk individuals. Individuals with hypertension who are overweight or obese are receiving even more advice, recognizing that multiple-risk individuals need greater attention regarding lifestyle modifications. These findings are bright spots in the research as our society moves from having infectious diseases be prevalent to a society where chronic disease rules.

As is the case with smoking, our society can make great strides in improving adherence to health recommendations with the help of research, policy, education, and self-motivation. After nearly four decades of work and convincing evidence of the

dangers of smoking, people still smoke and not all smokers receive advice to quit. The smoking example shows that we do not live in an ideal society where everyone adheres to recommendations, but we can make enormous improvements. Slowly but surely, our society will recognize that many of our health epidemics are largely preventable. With the assistance from environmental, behavioral, and policy changes, we will be able to combat the burden that decades of poor lifestyle choices have bestowed on us.

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