

Badger Heart Program: Health Screenings Targeted to Increase Cardiovascular Awareness in Women at Four Northern Sites in Wisconsin

Robert J Sanchez, RPh, MS; Lisette Khalil, MS

ABSTRACT

Purpose: This study reports the results of initial statewide health screenings of the Badger Heart Program (BHP), which aims to increase the cardiovascular health awareness and health status of women living in Wisconsin.

Methods: In May 2004, the BHP provided cardiovascular disease risk screenings to women in 4 geographic areas throughout Wisconsin. Screening participants were informed of their results and counseled on issues concerning diet, exercise, smoking cessation, medications, and/or visiting their primary health care professional. Data collected included total cholesterol, high-density lipoproteins, low-density lipoproteins (LDL), triglycerides, blood pressure (BP), blood glucose measurements, height and weight, along with a brief survey of medical history, family history, smoking status, and current medication use. After the screening, participants were asked to volunteer for an opt-in 6-month educational program.

Results: A total of 318 women participated. The majority screened were Caucasian (95.9%) with an average age of 58 years (standard deviation [SD] = 13.2). Participants' blood pressure and LDL goals were determined from the risk profile assessment. According to national guidelines, an optimal blood pressure goal of <140/90 was recommended for the majority of the participants (294 [92.5%]), while an optimal blood

pressure goal of <120/80 was recommended for only 24 (7.5%) participants. An optimal LDL value <100 was recommended for 48 (15.4%) participants, an LDL goal of <130 was recommended for 106 (33.3%), and an LDL goal of less than <160 was recommended for 157 (50.5%) participants. Of screened participants, 35% were not at BP goal, 32.4% were not at LDL goal, and 53.5% were not at both goals.

Conclusion: While the number of participants who were at BP and/or LDL goal is higher than what is generally reported in the literature, there is still opportunity for significant improvement. A follow-up analysis including re-screening of individuals aimed at measuring the improvements in CVD profile post educational interventions will occur in November.

INTRODUCTION

Heart disease and stroke are the first and third leading causes of death, respectively, among American women.¹ Overall, cardiovascular disease (CVD) claims the lives of more than 500,000 women each year in the United States, equating to 41.3% of all female deaths, which is greater than all types of cancers combined.² Coronary artery disease (CAD) accounts for the majority of CVD deaths in women, disproportionately afflicting racial and ethnic minorities and is a prime target for prevention.¹ Because CAD is often fatal, and because nearly two-thirds of women who die suddenly have no previously recognized symptoms, it is essential to prevent CAD.¹ Additionally, in the wake of reports resulting from the Women's Health Initiative and the Heart and Estrogen/Progestin Replacement Study (HERS), which unexpectedly showed that combination hormone therapy was associated with adverse CVD effects, there is a heightened need to critically review and document strategies to prevent CVD in women.³⁻⁵

Mr Sanchez is a clinical education consultant for Pfizer, Inc. He is also a graduate student at the University of Wisconsin School of Pharmacy in the Social and Administrative Science Department. Ms Khalil was the scientific development coordinator and First Breath coordinator at the Wisconsin Women's Health Foundation, Inc. and is currently a law student at Marquette University in Milwaukee, Wis. Please address correspondence to: Robert J. Sanchez, RPh, MS, Pfizer, Inc. 360 W Washington Ave, #804, Madison, WI, 53703; fax 608.251.2775; e-mail robert.j.sanchez@pfizer.com.

Despite the prevalence and severity of CVD among women, there is a lack of awareness regarding the disease. A national survey conducted in 1997 by the American Heart Association (AHA) showed that only 7% of women perceived CVD to be their greatest health threat and less than one-third knew it was the leading cause of death for American women.⁶ Since completion of the survey, several organizations, including the AHA and the Wisconsin Women's Health Foundation, have undergone education campaigns aiming to raise awareness about CVD risk and prevalence in women. A follow-up survey conducted in 2003 showed significant improvement, with 13% of respondents citing CVD as their greatest health risk and 46% identifying it as the leading cause of death for women.⁷ Although awareness about CVD in women has increased in the last 6 years, a significant gap between perceived and actual risk of CVD remains.

This gap in knowledge points to the importance of improving awareness through campaigns targeted at women. A recent publication of the AHA identified clinical recommendations for prevention and treating CVD specific to women.⁸ These clinical recommendations include:

Lifestyle Interventions

- Cigarette Smoking—Consistently encourage women not to smoke and to avoid environmental tobacco.
- Physical Activity—Consistently encourage women to undertake a minimum of 30 minutes of moderate-intensity physical activity on most to all days of the week.
- Cardiac Rehabilitation—Women with recent acute coronary syndrome or coronary intervention or angina should participate in a comprehensive risk-reduction regimen.
- Heart-Healthy Diet—Consistently encourage an overall healthy eating pattern including a variety of fruits, vegetables, grains, low-fat or non-fat dairy products, fish, legumes, and sources of protein low in saturated fat.
- Weight Maintenance/Reduction—Consistently encourage weight maintenance/reduction through an appropriate balance of physical activity, caloric intake, and formal behavioral programs.
- Psychosocial Factors—Women with CVD should be evaluated for depression and referred/treated when indicated.

Major Risk Factor Interventions

- Blood Pressure (Lifestyle)—Encourage an optimal blood pressure of <120/80 mm Hg through lifestyle modification approaches.

- Blood Pressure (Drugs)—Pharmacotherapy is indicated when blood pressure is >140/90 mmHg. Thiazide diuretics should be used first line unless contraindicated or past treatment failure.
- Lipids (Lipoproteins)—Optimal levels of lipids and lipoproteins in women (LDL-C <100 mg/dL, HDL-C >50 mg/dL, triglycerides <150 mg/dL and non-HDL-C <130 mg/dL) should be encouraged through lifestyle approaches.
- Lipids (Diet Therapy)—In high-risk women or when LDL-C is elevated, saturated fat, cholesterol, and trans fatty acid intake should be reduced.
- Lipids (Pharmacotherapy)—Initiate LDL-C lowering therapy simultaneously with lifestyle therapy in high-risk women with LDL-C >100 mg/dL and initiate statin therapy with a goal of LDL-C <100 mg/dL unless contraindicated.

The Wisconsin Women's Health Foundation's Badger Heart Program has been developed based on these clinical recommendations. The Badger Heart Program is designed to not only raise awareness about the severity and prevalence of CVD among women, but also to prevent future CVD by providing community-based interventions.

The purpose of this study was to increase the cardiovascular health awareness of women in Wisconsin. After screenings were completed, women were asked to participate in a 6-month intervention program consisting of health education, diet, exercise, healthy living, depression awareness, and stress reduction. This manuscript analyzes the results of the baseline screening.

METHODS

The Institutional Review Board (IRB) at Ministry Health Care approved this study. In May 2004, the Wisconsin Women's Health Foundation provided 4 site-specific screenings to women located in northern Wisconsin at Wausau, Stevens Point, Tomahawk, and Rhinelander. These screenings offered cholesterol level, blood glucose, and blood pressure checks free of charge to women who signed a consent form. All screening participants were informed of their results and counseled by a member of the Ministry Heart Care Screen Team (a registered nurse or a dietitian). This health counseling included advice about diet, exercise, smoking cessation, and/or visiting their primary health care professional.

Data collected at the screening events included total cholesterol, high-density lipoproteins (HDL), low-density lipoproteins (LDL), triglycerides, blood pressure, blood glucose level, height, and weight, along with a brief survey of medical history, family history, smoking status, and current medications. Patients were clas-

sified as being either at goal or not at goal according to the Joint National Committee (JNC) VII and National Cholesterol Education Program (NCEP) guidelines. Body Mass Index (BMI) was also calculated based on the subject's height and weight.

Determination of LDL goal

From the data collected, each subject's LDL goal was determined. Risk assessment was based on the Adult Treatment Panel (ATP) III guidelines. For individuals with 2 or more risk factors, a 10-year risk assessment was carried out with the Framingham's scoring card. Major risk factors included the following:

- Cigarette smoking
- Hypertension (BP \geq 140/90 mm Hg or on an antihypertensive agent)
- Low HDL (<40 mg/dl) (HDL \geq 60 mg/dl confers a negative risk factor; its presence removes 1 risk factor from the total count.)
- Family history of premature CHD (CHD in male first-degree relative <55 years of age, CHD in female first-degree relative <65 years of age)
- Age (men \geq 45 years, women \geq 55 years)

Recommended LDL goal

For subjects with \geq 2 risk factors, a 10-year CHD risk was calculated based on Framingham's scorecard to determine goal.

- Subject with 0 to 1 risk factors LDL goal <160
- Subjects with \geq 2 risk factors (10-year risk \geq 20%) LDL goal <130
- CHD or CHD risk equivalent (10-year risk >20%) LDL goal <100

JNC-VII Blood Pressure Goals

Patients were considered at goal if they had a blood pressure reading corresponding to the following:

- Blood pressure \geq 140/90 mm Hg
- Blood pressure \geq 130/80 for patients with diabetes or chronic kidney disease.

In order to ascertain the percent of subjects whose cardiovascular risk assessment could be changed, modifiable risk factors were evaluated. Modifiable risk factors were assessed in the baseline survey, and were defined as follows:

- Hypertension: systolic or diastolic blood pressure \geq 140/90, or a self report blood pressure
- Hyperlipidemia: total serum cholesterol levels \geq 240 mg/dl.
- Overweight: BMI (weight [in kg]/height[in m]²) \geq 25
- Diabetes: self report of diabetes or taking any anti-diabetic medication
- Current smoking

RESULTS

A total of 318 women were screened. The majority of women screened were Caucasian (95.9%) with an average age of 58 years (SD=13.2). Results for women participating in the screening can be seen in Table 1. Participants' blood pressure and LDL goal were determined from the risk profile assessment. An optimal blood pressure goal of <140/90 was recommended for the majority of the participants (294 [92.5%]), while an optimal blood pressure goal of <120/80 was recommended for only 24 (7.5%) participants. An optimal LDL value of <100 was recommended for 48 (15.4%) participants, a goal of <130 was recommended for 106 (33.3%), and a goal of <160 was recommended for 157 (50.5%) participants. Thirty-five percent of screened participants were not at BP goal, 32.4% were not at LDL goal and 53.5% were not at either goal. The number of participants at blood pressure goal, cholesterol goal (based on LDL), and both goals can be seen in Figure 1.

The number of participants with respect to modifiable risk factors can be seen in Table 2. In addition, classification of hypertension per JNC-VII was designated for each subject (Table 3). Among participants who were classified with high blood pressure, 26.4% were also overweight, 7.9% were classified as having high cholesterol, and 7.2% had 3 or more risk factors. Table 4 summarizes additional risk factors for participants. Each woman's level of activity was noted (Figure 2) indicating that 68% of women participated in moderate activity. Among women who reported height and weight (n=309), BMI calculations indicated that 5 (1.6%) were underweight, 93 (30.1%) were of ideal weight, 105 (34.0%) were overweight, and 106 (34.3%) were obese.

DISCUSSION

Hypertension is a well-established risk factor for CVD. For both men and women ages 40-69, increments of 20 mmHg in SBP or 10 mmHg of DBP increase the risk of death from ischemic heart disease and from other vascular disease more than 2-fold.⁹ In this study, the average SBP and DBP was 132/80; however, when subjects were stratified into JNC-VII classifications, 35% of screened subjects were categorized as having either stage 1 or stage 2 hypertension. This rate is high considering a prevalence study by Greenlund et al that found an average hypertension rate of 25.4%.¹⁰

In addition, our study indicated that 16.6% of subjects had hyperlipidemia, 72% were overweight, 6.6% were diabetic, and 3.2% were current smokers. These risk factors have been shown to greatly increase the risk of CVD. It is possible to decrease the likelihood of a

Table 1. Characteristics of the Variables Collected for the Cohort

| Variable | Avg (SD) [Range] (N = 318) |
|---|----------------------------|
| Age | 58 (13.2) [18-95] |
| SBP | 132 (19.3) [80-196] |
| DBP | 80 (35.2) [26-158] |
| TC | 208 (49.2) [80-292] |
| HDL | 53 (13.6) [15-100] |
| LDL | 120 (32.6) [33-247] |
| TG | 169 (108.3) [45-370] |
| BMI | 28 (6.5) [16.3-56.5] |
| Medical History* | |
| | Frequency [%] |
| Heart disease | 29 [9.1] |
| HBP | 113 [37.4] |
| Cholesterol | 123 [38.6] |
| Diabetes | 21 [6.6] |
| Stroke | 10 [3.1] |
| Family History* | |
| | Frequency [%] |
| Heart disease (father) | 56 [17.6] |
| Heart disease (mother) | 34 [10.7] |
| Diabetes | 91 [28.6] |
| Breast cancer | 48 [15.1] |
| Medication History* | |
| | Frequency [%] |
| Taking blood pressure medications (yes) | 19 [6.0] |
| Taking lipid medications (yes) | 115 [36.0] |
| Taking diabetic medications (yes) | 62 [19.5] |

* Self-reported histories

SBP = systolic blood pressure, DBP = diastolic blood pressure, TC = total cholesterol, HDL = high density lipoprotein, LDL = low density lipoprotein, TG = triglycerides, BMI = body mass index

Table 2. Selected Modifiable Risk Factors of Screened Women in Wisconsin*

| Modifiable Risk Factor | Number (%) |
|----------------------------|------------|
| High Blood Pressure | |
| Yes | 111 (35.1) |
| No | 205 (64.9) |
| High Cholesterol | |
| Yes | 51 (16.1) |
| No | 266 (83.9) |
| Overweight | |
| Yes | 210 (72.4) |
| No | 80 (27.6) |
| Diabetes | |
| Yes | 21 (6.60) |
| No | 294 (93.4) |
| Smokes | |
| Yes | 10 (3.2) |
| No | 306 (96.8) |

* Percentage of sample based on non-missing values

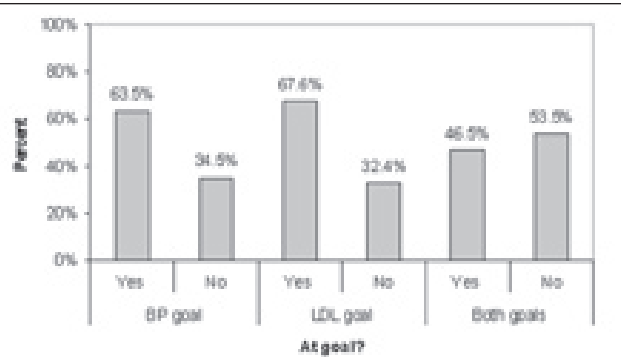


Figure 1. Percent of subjects at JNC-VII and/or NCEP goals. BP = blood pressure, LDL = low density lipoprotein.

Table 3. Blood Pressure Classification of Women Screened in Wisconsin*

| BP Classification | SBP | Criteria | DBP | Number |
|----------------------|---------|----------|-------|------------|
| Normal | <120 | and | <80 | 70 (22.0) |
| Prehypertension | 120-139 | or | 80-89 | 135 (42.5) |
| Stage 1 hypertension | 140-159 | or | 90-99 | 81 (25.5) |
| Stage 2 hypertension | ≥160 | or | ≥100 | 30 (9.4) |

* Does not take into consideration subjects with chronic kidney disease

Table 4. Percentage of Patients with More than 1 Risk Factor

| Risk Factor | Additional Risk Factor | Percent (N = 318) |
|-----------------------------------|-----------------------------------|-------------------|
| High Cholesterol | Overweight | 5.7 |
| | Current smoker | 0.6 |
| | Diabetes | 0.0 |
| | High blood pressure | 7.9 |
| | At least 1 additional risk factor | 5.9 |
| Overweight | High cholesterol level | 14.2 |
| | Current smoker | 2.5 |
| | Diabetes | 4.7 |
| | High blood pressure | 26.4 |
| Diabetes | At least 1 additional risk factor | 7.3 |
| | High cholesterol level | 0.0 |
| | Overweight | 4.7 |
| | Current smoker | 0.0 |
| Current smoker | High blood pressure | 1.2 |
| | At least 1 additional risk factor | 0.9 |
| | High cholesterol level | 0.6 |
| | Overweight | 2.5 |
| High blood pressure | Diabetes | 0.0 |
| | High blood pressure | 1.6 |
| | At least 1 additional risk factor | 0.6 |
| | High cholesterol level | 7.9 |
| Overweight | High cholesterol level | 7.9 |
| | Overweight | 26.4 |
| | Current smoker | 1.6 |
| | Diabetes | 0.9 |
| At least 1 additional risk factor | Diabetes | 0.9 |
| | At least 1 additional risk factor | 7.2 |

cardiovascular event through primary interventions. For example, several primary prevention studies, including the West of Scotland Coronary Prevention Study, the Air Force Coronary Atherosclerosis Prevention Study, and the Anglo-Scandinavian Cardiac Outcomes Trial: Lipid Lowering Arm, have shown cholesterol lowering reduced both coronary events and mortality.¹¹⁻¹³ In addition to a deleterious impact on cardiovascular health, obesity may also contribute to insulin resistance and glucose intolerance, further worsening the health of the individual. Engaging in regular exercise, maintaining a desirable body weight, eating a healthy diet, and not smoking could account for an 84% reduction in cardiovascular risk.¹⁴

Several methodological limitations should be mentioned. First, it was assumed that a patient had high cholesterol and/or high blood pressure based on the results of the screening. According to JNC-VII, the classification of hypertension is based on the average of 2 or more properly-measured seated readings on each of 2 or more office visits. For the purpose of this analysis a patient was classified as having high blood pressure based on only 1 reading. In addition, blood pressure goals were based on data provided. Since the questionnaire failed to ask about kidney disease, the goal of <130/80 was based solely on the diabetic profile. Secondly, biases in patient selection cannot be ruled out. Site screenings were announced via newspaper and flyer announcement. It is not known how this limited dispersal may have affected patient selection. In addition, subjects who participated in the screening may take a proactive stance in response to their health care needs; consequently, these subjects may be in better health than those who chose not to partake in the screening.

There have been previous studies documenting that a beneficial cardiovascular profile is related to improved cardiovascular mortality and a longer life expectancy.¹⁵⁻¹⁶ In addition, a decrease in risk factors was associated with a lower Medicare cost in later years.¹⁷ If the perceived risk of heart disease is not high, less proactive heart disease strategies to improve cardiovascular profile or reduce modifiable risk factors will not be undertaken by women. Therefore, prevention strategies targeted to younger women deserve attention. It is the goal of the Wisconsin Women's Health Foundation, Inc. to increase awareness of perceived cardiovascular risk in all women in Wisconsin.

ACKNOWLEDGMENTS/FINANCIAL SUPPORT

We would like to thank Pfizer, Ministry Health Care,

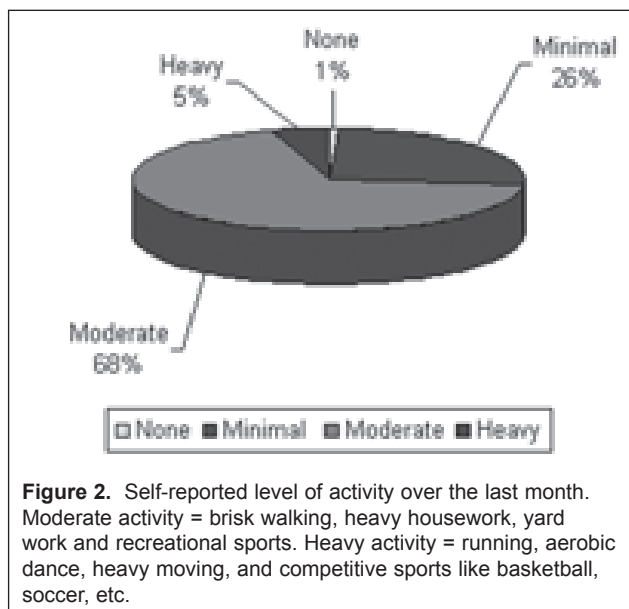


Figure 2. Self-reported level of activity over the last month. Moderate activity = brisk walking, heavy housework, yard work and recreational sports. Heavy activity = running, aerobic dance, heavy moving, and competitive sports like basketball, soccer, etc.

Nora Weber and Julie Whitehorse for their invaluable contributions to this program.

REFERENCES

1. American Heart Association. Heart Disease and Stroke Statistics – 2004 Update. Available at: www.americanheart.org/downloadable/heart/1075102824882HDSStats2004UpdateREV1-23-04.pdf Accessed July 7, 2005.
2. US Centers for Disease Control, National Center for Health Statistics. Mortality Trends. Available at: http://www.cdc.gov/nchs/data/series/sr_03/sr03_001acc.pdf. Accessed July 30, 2005.
3. Rossouw JE, Anderson GL, Prentice RL, et al. Risks and benefits of estrogen plus progestin in healthy postmenopausal women. principal results from the Women's Health Initiative randomized controlled trial. writing group for the Women's Health Initiative investigators. *JAMA*. 2002;288:321-333.
4. Manson JE, Jsia J, Johnson KC, et al. Estrogen plus progestin and the risk of coronary heart disease. Women's Health Initiative investigators. *N Engl J Med*. 2003;349:523-534.
5. Hulley S, Grady D, Bush T, et al. Randomized trial of estrogen plus progestin for secondary prevention of coronary heart disease in postmenopausal women. Heart and Estrogen/Progestin Replacement Study (HERS) research group. *JAMA*. 1998;280:605-613.
6. Mosca L, Jones WK, Kind KB, et al. American Heart Association Women's Heart Disease and Stroke Campaign Task Force: awareness, perception, and knowledge of heart disease risk and prevention among women in the United States. *Arch Fam Med*. 2000;9:506-515.
7. Mosca L, Ferris A, Fabunmi R, Robertson RM. Tracking women's awareness of heart disease. *Circulation*. 2004;109:573-579.
8. Mosca L, Appel LJ, Benjamin EJ, Berra K, et al. Evidence-based guidelines for cardiovascular disease prevention in women. *Circulation*. 2004;109:672-693.
9. Prospective Studies Collaboration. Age-specific relevance of usual blood pressure to vascular mortality. a meta analysis of

- individual data for one million adults in 61 prospective studies. *Lancet*. 2002;360:1903-1913.
10. Greenlund KJ, Zheng ZJ, Keenan NL, et al. Trends in self-reported multiple cardiovascular disease risk factors among adults in the united states, 1991-1999. *Arch Intern Med*. 2004;164:181-188.
 11. Shepherd J, Cobbe SM, Ford I, et al. Prevention of coronary heart disease with pravastatin in men with hypercholesterolemia. *N Engl J Med*. 1995;333:1301-1307.
 12. Downs JR, Clearfield M, Weis S, et al. AFCAPS/TexCAPS Research Group. Primary prevention of acute coronary events with lovastatin in men and women with average cholesterol levels: results of AFCAPS/TexCAPS. *JAMA*. 1998;279:1615-1622.
 13. Sever PS, Dahlof B, Poulter NR, et al. Prevention of coronary and stroke events with atorvastatin in the Anglo Scandinavian cardiac outcomes trial-lipid lowering arm (ASCOT-LLA): a multicenter randomized controlled trial. *Lancet*. 2003;361:1149-1158.
 14. Stampfer MJ, Hu FB, Manson JE, et al. Primary prevention of coronary heart disease in women through diet and lifestyle. *N Engl J Med*. 2000;343:16-22.
 15. Stamler J, Stamler R, Neaton JD, et al. Low risk-factor profile and long-term cardiovascular and non-cardiovascular mortality and life expectancy: findings for 5 large cohort of young adult and middle-aged men and women. *JAMA*. 1999;282:2012-2018
 16. Yusuf HF, Giles WH, Croft JB, et al. Impact of multiple risk factor profiles on determining cardiovascular disease risk. *Prev Med*. 1998;27:1-9.
 17. Daviguls ML, Liu K, Greenland P, et al. Benefit of a favorable cardiovascular risk-factor profiles in middle age with respect to Medicare cost. *N Engl J Med*. 1998;339:1122-1129.