

# Cardiovascular Risk Factors and Lifestyle Habits Among Preventive Cardiovascular Nurses

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The cornerstone of cardiovascular disease prevention is the promotion of a healthy lifestyle and the identification and reduction of cardiovascular risk factors. Cardiology nurses play a major role in counseling patients about lifestyle and cardiovascular risk factors. We used an e-mail survey to elicit self-reported prevalence of cardiovascular risk factors and healthy lifestyles among the Preventive Cardiovascular Nurses Association (PCNA) members and compared their risk profiles with published data for American cardiologists, the Nurses' Health Study 2, and the Behavioral Risk Factor Surveillance Survey data for women. **Results:** A total of 1,345 complete surveys were collected. The respondents were mostly women (96%), with mean (SD) age of 47.4 (8.7) years. More than 95% were not cigarette smokers, more than 50% had a healthy body mass index (<25), and more than 56% achieved the recommended levels of physical activity. Nevertheless, obesity (body mass index  $\geq 30$ ) was a health risk in one-fifth of PCNA respondents. The rates of hypertension (17%) and dyslipidemia (15%) were lower than rates reported in other national samples; however, the rate for family history of premature heart disease (20%) was similar to those reported in national samples. Since family history of premature heart disease may be a more significant risk factor in women, PCNA respondents with such a family history may require targeted interventions to further reduce their risk and improve their lifestyle behaviors. **Conclusion:** PCNA nurses have more favorable lifestyle profiles compared with national samples. It can be expected that nurses who know their risk factors and who follow healthy lifestyle behaviors will be more effective in these counseling roles.

**KEY WORDS:** cardiovascular nurses, cardiovascular risk factor prevalence, healthy lifestyles

Cardiovascular disease (CVD) remains the number 1 killer of American men and women. Although more than 148,000 Americans who died of CVD in 2004 were younger than 65 years, increasing age is a powerful risk factor for CVD.<sup>1</sup> The average age and lifespan of Americans is increasing, leading to a greater prevalence of CVD. The healthcare workforce is also aging. The average age of registered nurses in the United States was 46.8 years in 2004. More than 41% of nurses were 50 years or older in 2004, representing a dramatic increase from 25% in 1980 to 33% in 2000,<sup>2</sup> suggesting that the risk

of CVD among practicing nurses would have also increased.

The cornerstone of CVD prevention is the promotion of a healthy lifestyle and the identification and reduction of cardiovascular risk factors. In the Nurses Health Study,<sup>3</sup> a total of 84,129 women were assessed for healthy lifestyle factors, including absence of current smoking, half an hour or more per day of moderate or vigorous physical activity, body mass index (BMI) of less than 25 kg/m<sup>2</sup>, a dietary score in the top 40% (included diets with lower amounts of *trans*-fats, lower glycemic load, higher cereal fiber, higher marine omega-3 fatty acids, higher folate, and higher polyunsaturated to saturated fat ratio), and drinking one-half glass or more of wine per day (or equivalent alcohol consumption). When 3, 4, or 5 of these healthy lifestyle factors were present, risk for coronary heart disease over a 14-year period was reduced by 57%, 66%, and 83%, respectively.

A recent survey<sup>4</sup> assessed the personal health habits of American cardiologists and compared their self-reported risk factors with an age-matched sample drawn from the national Behavioral Risk Factor

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Surveillance System.<sup>5</sup> Lower rates of risk factors were observed among 471 cardiologists (average age, 48.6 years) compared with matched cohorts from the US population. Furthermore, cardiologists engaged in more medical and lifestyle interventions to reduce CVD risk factors. To date, similar studies have not been conducted among cardiovascular nurses in the United States.

Cardiovascular nurses provide much of the counseling and education for CVD risk reduction and likely serve as role models for behavior change.<sup>6</sup> It can be expected that nurses who know their risk factors and who follow healthy lifestyle behaviors will be more effective in these counseling roles. Therefore, the purpose of this study was 2-fold: (1) using an e-mail survey, to elicit the self-reported prevalence of cardiovascular risk factors and healthy lifestyles among a group of cardiovascular nurses expected to have knowledge and awareness of their personal risk factors for CVD and (2) to compare these risk profiles to published data for groups such as American cardiologists,<sup>4</sup> the Behavioral Risk Factor Surveillance Survey (BRFSS) 2007 data for women,<sup>7</sup> and the Nurses Health Survey cohort 2 (NHS2) (D. Feskanich, personal communication of selected 2005 survey data, 2008). The dissemination of these survey results to nursing professionals is a critical step to prompting overall risk awareness and could lead to health improvements among nurses. This study also provides information for future health education and interventions directed at nurses' health.

## Methods

### Sample

The survey population included past and present nurse members of the Preventive Cardiovascular Nurses Association (PCNA) who had known e-mail addresses. These e-mail addresses are part of the database at the PCNA national office and were used to recruit the participants. The nurse members worked in a variety of inpatient and outpatient cardiology settings distributed across the United States. Preventive Cardiovascular Nurses Association members are known for their leadership in the area of cardiovascular risk reduction and comprise a nurse group that should have knowledge and awareness of their personal CVD risk factors.

### Data Collection Instrument

Information on the participants was collected by a self-report survey adapted from the Cardiologists' Lifestyle Survey with permission of the authors. The cardiologists' survey<sup>4</sup> consisted of a 1-page, 25-item form that was mailed to participants with return postage. Their

form was divided into 3 sections: baseline information, medical illnesses (yes/no format), and selected medication use. Baseline demographics included age, sex, height, weight, and personal habits such as smoking, alcohol intake, and exercise. For use in the PCNA study, the Cardiologists' Lifestyle Survey was modified in 2 ways. First, the questions were converted to a Web-based survey. Second, questions were added to include ethnicity; levels of general and workplace stress; dietary servings of fruits, vegetables, fish, and fats; blood pressure ranges; cholesterol levels for total cholesterol, low-density lipoprotein cholesterol, and high-density lipoprotein (HDL) cholesterol; and menopausal status. Depression was added to the listing of medical illnesses. The PCNA Web-based format consisted of "check boxes" for the presence and level of traditional cardiovascular risk factors, for medical illnesses associated with CVD, and for common medications used for preventing or treating cardiovascular risk factors or disease. Participants were asked to indicate the types and dose frequency for 9 categories of medications.

### Procedure

The survey was conducted through [www.SurveyMonkey.com](http://www.SurveyMonkey.com). In September 2007, e-mails ( $n = 5,163$ ) were sent to all current and past members using archived e-mail addresses from the membership database. It cannot be ascertained if the e-mail addresses were current or if the e-mails were received. This initial e-mail explained the study, its risks and benefits, and the consent process and directed nurses to the Survey Monkey Web site where they would click on the PCNA survey. The recruitment e-mail informed the nurses that completing the Web-based survey implied consent to use the collected data, that the collected data would be stripped of the e-mail address and stored in an encrypted and secure database, that no identifying information would be collected, and that no individual data would be used for any purpose. The survey took about 10 minutes to complete. Permission to conduct this study was obtained from the university institutional review board at Loyola University Chicago.

Two strategies were used to enhance the survey response. First, a reminder notice was sent to all PCNA members approximately 3 to 4 weeks after the first e-mail, again asking members to complete the survey. Second, PCNA provided five \$50.00 American Express gift certificates for a prize drawing as an incentive to complete the survey. To maintain anonymity, after completing the survey, respondents were directed to an optional unrelated online form that collected personal data for the prize drawings. Once the drawings and prizes were awarded, this database was deleted.

## Data Analysis

Data were recorded by Survey Monkey software and stored in a software database maintained by the PCNA national office. Data were stripped of e-mail identifiers, and then the data file was exported as an Microsoft Excel file onto one investigator's local computer for further analysis. These raw data were reviewed for completeness and data accuracy. Improbable data responses were recoded to missing. The data file was then imported into a SPSS statistical software (version 16.0, SPSS Inc, Chicago, Illinois) program for analyses. Descriptive statistics using counts and proportions were used for categorical variables, and means and standard deviations were used for continuous variables.

## Results

E-mails ( $n = 5,163$ ) were sent to all current and past members using archived e-mail addresses from the membership database. A total of 1,358 surveys were completed in the Survey Monkey database. After data review, 13 surveys were eliminated because of largely incomplete surveys, yielding 1345 completed surveys and a potential response rate of 26%.

The respondents were mostly women (96%), ranging from 22 to 69 years of age. Mean age (SD) was 47.4 (8.7) years. The cardiovascular and lifestyle risk factors are shown in Table 1. Few respondents reported smoking cigarettes (3.6%); most had a BMI of less than 30 (77.3%), whereas 20.5% had a BMI of greater than 30 and would be categorized as obese. Regular exercise for at least 20 to 30 minutes 3 times or more a week was reported by 55.6%, whereas 11.7% reported no regular exercise. Dietary intake of fruits and vegetables was high, with most reporting at least 2 servings of fruit and 2 servings of vegetables a day. Almost 80% reported having at least 1 serving of fish a week. For those who consumed alcohol (77%), red wine was the usual beverage for most (34%), followed by white wine (24%).

Few respondents reported a personal history of CVD (1.7%) or a history of diabetes (3%). More than 20% reported a family history of premature CAD. Personal cardiovascular risk factors included a history of hypertension (17.1%), a history of dyslipidemia (15.4%), and a history of depression (13%). More than half of the PCNA respondents reported moderate to high life and workplace stress (58.4% and 61.8%, respectively).

More than 89% reported that their cholesterol had been checked in the past 2 years. Most reported a total cholesterol of less than 200 (65.7%) and low-density lipoprotein cholesterol of less than 130 (78.1%), with HDL levels more than 40 reported by most respon-

dents (80%). Few respondents reported use of lipid-lowering medication (statin use in 14.9%, non-statin medication use in 2.8%, and niacin use in 2.4%; data not shown); however, the use of lipid-lowering medications is consistent with the proportion of nurses reporting a history of hyperlipidemia.

Most lifestyle factors were not significantly different between PCNA male and female respondents with the exceptions of BMI category, servings of red meat and alcohol use (see Table 1). Compared to men, a greater proportion of PCNA women had a BMI of less than 25, consumed fewer servings of red meat and reported less alcohol use. However, CVD risk factors were significantly different between PCNA women and men. Not unexpectedly, the proportion of PCNA men with HDL cholesterol levels less than 40 mg/dL was significantly higher compared to the women. Reported histories of hypertension, diabetes mellitus, and dyslipidemia were also significantly higher in PCNA men compared to women.

## Comparison of PCNA Respondents to Other Databases

We chose to compare our results with the published reports on American cardiologists,<sup>4</sup> BRFSS 2007<sup>7</sup> data for women, and NHS2 (D. Feskanich, personal communication, 2005) (see Table 2). A survey of practicing cardiologists was conducted in 2004–2005 to assess their personal health habits related to CVD risk.<sup>4</sup> Surveys were mailed to 800 cardiologists, and 471 responses were obtained (59% response rate). The respondents were predominantly men (93%), with an average age of 48.6 years. The initial focus of our investigation was to compare American cardiologists to our survey data, but the known differences in CVD risk factors in men and women and the skewed representation of women in the cardiologists' report led us to seek a comparison population comprised of women. The BRFSS 2003 is an ongoing data collection project examining behavioral risk factors in the adult US population aged 45 to 54 years.<sup>5</sup> Data are compiled and public use datasets are available on the Centers for Disease Control Web site. We chose to compare the PCNA survey data to the BRFSS 2007<sup>7</sup> since the survey dates were close. We further selected data grouped by gender and used only data from women to compare to the PCNA women. The Nurses' Health Study 2 (NHS2) (D. Feskanich, personal communication, 2008) began in 1989, includes 116,678 female registered nurses who are surveyed every 2 years. We chose the 2005 survey data when participants were 41 to 60 years of age to compare with our PCNA women and did not use data from cumulative years in order to be consistent with other studies which have only one survey point. Comparisons

**TABLE 1** Self-Reported Cardiovascular Risk and Lifestyle Factors (All and by Sex)

|  | PCNA All    | PCNA Women  | PCNA Men    | Women Versus Men, <i>P</i> |
|--|-------------|-------------|-------------|----------------------------|
| n  | 1345        | 1294 (96.2) | 51 (3.8)    |                            |
| Age, mean (SD), y                        | 47.37 (8.7) | 47.4 (8.6)  | 45.6 (11.0) | .14                        |
| Age range, y                             | 22–69       | 22–69       | 26–69       |                            |
| BMI, kg/m <sup>2</sup>                   |             |             |             |                            |
| <25, n (%)                               | 662 (49.2)  | 652 (50.4)  | 10 (19.6)   | .000                       |
| 25 to <30                                | 378 (28.1)  | 351 (27.1)  | 27 (52.9)   | .000                       |
| 30 to <35                                | 155 (11.5)  | 146 (11.3)  | 9 (17.6)    | .18                        |
| 35 to <40                                | 75 (5.6)    | 72 (5.6)    | 3 (5.9)     | .76                        |
| ≥40                                      | 46 (3.4)    | 45 (3.5)    | 1 (2.0)     | .47                        |
| Missing                                  | 29 (2.2)    | 28 (2.1)    | 1 (2.0)     |                            |
| Smoking status                           |             |             |             | .84                        |
| Never smoked                             | 932 (69.3)  | 898 (69.4)  | 34 (66.7)   |                            |
| Former smoker                            | 348 (25.9)  | 333 (25.7)  | 15 (29.4)   |                            |
| Current (1–10/d)                         | 35 (2.6)    | 34 (2.6)    | 1 (2)       |                            |
| Current (>10/d)                          | 14 (1.0)    | 13 (1)      | 1 (2)       |                            |
| Missing                                  | 16 (1.2)    | 16 (1.2)    | ...         |                            |
| Exercise habits                          |             |             |             | .65                        |
| None                                     | 158 (11.7)  | 154 (11.9)  | 4 (7.8)     |                            |
| 1–2 Times per wk                         | 426 (31.7)  | 407 (31.5)  | 19 (37.3)   |                            |
| 3–4 Times per wk                         | 483 (35.9)  | 467 (36.1)  | 16 (31.4)   |                            |
| ≥5 Times per wk                          | 265 (19.7)  | 254 (19.6)  | 11 (21.6)   |                            |
| Missing                                  | 13 (1.0)    | 12 (0.9)    | 1 (2)       |                            |
| Servings of fruits                       |             |             |             | .07                        |
| None                                     | 22 (1.6)    | 20 (1.5)    | 2 (3.9)     |                            |
| 1/d                                      | 265 (19.7)  | 248 (19.2)  | 17 (33.3)   |                            |
| 2/d                                      | 536 (39.9)  | 515 (39.8)  | 21 (41.2)   |                            |
| 3/d                                      | 332 (24.7)  | 326 (25.2)  | 6 (11.8)    |                            |
| 4/d                                      | 122 (9.1)   | 121 (9.4)   | 1 (2.0)     |                            |
| 5 or more per day                        | 63 (4.7)    | 59 (4.7)    | 2 (7.9)     |                            |
| Missing                                  | 5 (0.4)     | 5 (0.4)     | ...         |                            |
| Servings of vegetables                   |             |             |             | .30                        |
| None                                     | 7(0.5)      | 6 (0.5)     | 1 (2.0)     |                            |
| 1/d                                      | 163 (12.1)  | 153 (11.8)  | 10 (19.6)   |                            |
| 2/d                                      | 500 (37.2)  | 480 (37.1)  | 20 (39.2)   |                            |
| 3/d                                      | 348 (25.9)  | 337 (26.0)  | 11 (21.6)   |                            |
| 4/d                                      | 181 (13.5)  | 177 (13.7)  | 4 (7.8)     |                            |
| 5 or more per day                        | 141 (10.4)  | 136 (10.7)  | 5 (9.9)     |                            |
| Missing                                  | 5 (0.4)     | 5 (0.4)     | ...         |                            |
| Servings of fish                         |             |             |             | .40                        |
| None                                     | 258 (19.2)  | 248 (19.2)  | 10 (19.6)   |                            |
| 1/wk                                     | 562 (41.8)  | 543 (42.0)  | 19 (37.3)   |                            |
| 2/wk                                     | 325 (24.2)  | 314 (24.3)  | 11 (21.6)   |                            |
| 3/wk                                     | 123 (9.1)   | 114 (8.8)   | 9 (17.6)    |                            |
| 4/wk                                     | 37 (2.8)    | 36 (2.8)    | 1 (2.0)     |                            |
| 5 or more per week                       | 30 (2.2)    | 29 (2.3)    | 1 (2.0)     |                            |
| Missing                                  | 10 (0.7)    | 10 (0.8)    | ...         |                            |
| Servings of red meat                     |             |             |             | 0.000                      |
| None                                     | 198 (14.7)  | 188 (14.5)  | 10 (19.6)   |                            |
| 1/wk                                     | 374 (27.8)  | 369 (28.5)  | 5 (9.8)     |                            |
| 2/wk                                     | 354 (26.3)  | 340 (26.3)  | 14 (27.5)   |                            |
| 3/wk                                     | 209 (15.5)  | 199 (15.4)  | 10 (19.6)   |                            |
| 4/wk                                     | 111 (8.3)   | 106 (8.2)   | 5 (9.8)     |                            |
| 5/wk                                     | 51 (3.8)    | 47 (3.6)    | 4 (7.8)     |                            |
| 6 or more per week                       | 36 (2.6)    | 33 (2.6)    | 3 (5.9)     |                            |
| Missing                                  | 12 (0.9)    | 12 (0.9)    | ...         |                            |
| Fats or oils routinely used <sup>a</sup> |             |             |             |                            |
| Butter                                   | 382 (28.4)  | 366 (28.3)  | 16 (31.4)   |                            |
| Margarine                                | 474 (35.2)  | 453 (35.0)  | 21 (41.2)   |                            |
| Olive oil                                | 1052 (78.2) | 1018 (78.7) | 34 (66.7)   |                            |
| Canola oil                               | 607 (45.1)  | 592 (45.7)  | 15 (29.4)   |                            |
| Other                                    | 1156 (85.9) | 1110 (85.8) | 46 (90.2)   |                            |

(continued)

TABLE 1 (continued)

|                                    | PCNA All    | PCNA Women  | PCNA Men  | Women Versus Men, <i>t</i> or $\chi^2$ |
|------------------------------------|-------------|-------------|-----------|--|
| Alcohol use                        |             |             |           | 0.009                                  |
| None                               | 304 (22.6)  | 287 (22.2)  | 17 (33.3) |  |
| 1–2/mo                             | 426 (31.7)  | 415 (32.1)  | 11 (21.6) |  |
| 1–2/wk                             | 268 (19.9)  | 262 (20.2)  | 6 (11.8)  |  |
| 3–4/wk                             | 220 (16.4)  | 211 (16.3)  | 9 (17.6)  |  |
| 1–2/d                              | 111 (8.3)   | 105 (8.1)   | 6 (11.8)  |  |
| 5 or more per day                  | 9 (0.7)     | 7 (0.5)     | 2 (3.9)   |  |
| Missing                            | 7 (0.5)     | 7 (0.5)     | ...       |  |
| Usual type of alcohol <sup>a</sup> |             |             |           | 0.01                                   |
| Red wine                           | 458 (34.1)  | 446 (34.5)  | 12 (23.5) |  |
| White wine                         | 320 (23.8)  | 315 (24.3)  | 5 (9.8)   |  |
| Spirits                            | 123 (9.1)   | 115 (8.9)   | 8 (15.7)  |  |
| Beer                               | 152 (11.3)  | 143 (11.1)  | 9 (17.6)  |  |
| Missing                            | 292 (21.7)  | 275 (21.3)  | 17 (33.3) |  |
| Systolic blood pressure, mm Hg     |             |             |           | 0.002                                  |
| <120                               | 849 (63.1)  | 830 (64.1)  | 19 (37.3) |  |
| 120–129                            | 352 (26.2)  | 330 (25.5)  | 22 (43.1) |  |
| 130–139                            | 113 (8.4)   | 105 (8.1)   | 8 (15.7)  |  |
| 140–159                            | 21 (1.6)    | 20 (1.5)    | 1 (2.0)   |  |
| ≥160                               | ...         | ...         | ...       |  |
| Missing                            | 10 (0.7)    | 9 (0.7)     | 1 (2.0)   |  |
| General life stress                |             |             |           | 0.05                                   |
| None                               | 22 (1.6)    | 19 (1.5)    | 3 (5.9)   |  |
| Mild                               | 517 (38.4)  | 495 (38.3)  | 22 (43.1) |  |
| Moderate                           | 660 (49.1)  | 639 (49.4)  | 21 (41.2) |  |
| High                               | 125 (9.3)   | 122 (9.4)   | 3 (5.9)   |  |
| Missing                            | 21 (1.6)    | 19 (1.5)    | 2 (3.9)   |  |
| Workplace stress                   |             |             |           | 0.81                                   |
| None                               | 38 (2.8)    | 36 (2.8)    | 2 (3.9)   |  |
| Mild                               | 462 (34.3)  | 447 (35.4)  | 15 (29.4) |  |
| Moderate                           | 635 (47.2)  | 608 (47.0)  | 27 (52.9) |  |
| High                               | 196 (14.6)  | 189 (14.6)  | 7 (13.7)  |  |
| Missing                            | 14 (1.0)    | 14 (1.1)    | ...       |  |
| Checked cholesterol in past 2 y    |             |             |           | 0.46                                   |
| Yes                                | 1202 (89.4) | 1155 (89.3) | 47 (92.2) |  |
| No                                 | 140 (10.4)  | 136 (10.5)  | 4 (7.8)   |  |
| Missing                            | 3 (0.2)     | 3 (0.2)     | ...       |  |
| Total cholesterol, mg/dL           |             |             |           | 0.47                                   |
| <200                               | 883 (65.7)  | 848 (65.5)  | 35 (68.6) |  |
| 200–239                            | 274 (20.4)  | 263 (20.3)  | 11 (21.6) |  |
| ≥240                               | 37 (2.8)    | 37 (2.9)    | ...       |  |
| Missing                            | 151 (11.2)  | 146 (1.3)   | 5 (9.8)   |  |
| LDL cholesterol, mg/dL             |             |             |           | 0.85                                   |
| <100                               | 651 (48.4)  | 634 (48.2)  | 27 (52.9) |  |
| 100–129                            | 400 (29.7)  | 385 (29.8)  | 15 (29.4) |  |
| 130–159                            | 103 (7.7)   | 101 (7.8)   | 2 (3.9)   |  |
| 160–189                            | 27 (2.0)    | 26 (2.0)    | 1 (2.0)   |  |
| ≥190                               | 4 (0.3)     | 4 (0.3)     | ...       |  |
| Missing                            | 160 (11.9)  | 154 (11.9)  | 6 (11.8)  |  |
| HDL cholesterol, mg/dL             |             |             |           | 0.000                                  |
| <40                                | 111 (8.3)   | 99 (7.7)    | 12 (23.5) |  |
| 40–59                              | 549 (40.8)  | 521 (40.3)  | 28 (54.9) |  |
| ≥60                                | 527 (39.2)  | 523 (40.4)  | 4 (7.8)   |  |
| Missing                            | 158 (11.7)  | 151 (11.7)  | 7 (13.7)  |  |
| History of CAD or vascular disease | 23 (1.7)    | 21 (1.6)    | 2 (3.9)   | 0.21                                   |
| Family history of premature CAD    | 275 (20.4)  | 265 (20.5)  | 10 (19.6) | 1.0                                    |
| History of hypertension            | 238 (17.1)  | 221 (17.1)  | 17 (33.3) | 0.007                                  |
| History of diabetes mellitus       | 40 (3.0)    | 35 (2.7)    | 5 (9.8)   | 0.02                                   |
| History of dyslipidemia            | 207 (15.4)  | 193 (14.9)  | 14 (27.5) | 0.03                                   |
| History of depression              | 175 (13.0)  | 172 (13.3)  | 3 (5.9)   | 0.14                                   |

Abbreviations: BMI, body mass index; CAD, coronary artery disease; HDL, high-density lipoprotein; LDL, low-density lipoprotein; PCNA, Preventive Cardiovascular Nurses Association.

<sup>a</sup>Not mutually exclusive, more than one response could be checked.

**TABLE 2** Self-reported Cardiovascular Risk and Lifestyle Factors of PCNA Women Compared With Other Groups

|  | PCNA Women <sup>a</sup> | CLS <sup>b</sup> | BRFSS 2007 for Women <sup>c</sup> | NHS2 <sup>d</sup> |
|--|-------------------------|------------------|-----------------------------------|-------------------|
| n                                      | 1,294                   | 471              | 430,912                           | 97,627            |
| Women, %                               | 96.2                    | 7.1              | 62.7                              | 100               |
| Age, mean (SD), y                      | 47.4 (8.6)              | 48.6 (8.9)       |                                   | 50.95 (4.6)       |
| Age range, y                           | 22–69                   |                  | 18 and older                      |                   |
| BMI, %                                 |                         |                  |                                   |                   |
| <25, n (%)                             | 50.4                    | 51               | 44.6                              | 41.4              |
| 25 to <30                              | 27.1                    | 41               | 29.7                              | 27.5              |
| ≥30                                    | 20.4                    | 8.0              | ≥30 = 25.9                        | 26.3              |
| Smoking status, %                      |                         |                  |                                   |                   |
| Never smoked                           | 69.4                    | 84               | 59.7                              | 64.9              |
| Former smoker                          | 25.7                    | 14               | 21.3                              | 27.2              |
| Current                                | 3.6                     | 1.7              | 18.0                              | 8.0               |
| Exercise habits, %                     |                         |                  |                                   |                   |
| None                                   | 11.9                    | 11               | 24.5                              | 19.0              |
| 1–2 times/wk                           | 31.5                    | 31               |                                   | 24.1              |
| 3–4 times/wk                           | 36.1                    | 41               |                                   | 35.4              |
| ≥5 times/wk                            | 19.6                    | 17               | 47.5                              | 20.7              |
| Alcohol use, % <sup>e</sup>            |                         |                  |                                   |                   |
| None                                   | 22.2                    | 28               |                                   | 49.4              |
| 1–2/mo                                 | 32.1                    |                  |                                   | Any = 50.4        |
| 1–2/day                                | 8.1                     | 47               | ≥2/d = 4.5                        |                   |
| Usual type of alcohol <sup>f</sup>     |                         |                  |                                   |                   |
| Red wine                               | 34.5                    | 71               |                                   |                   |
| White wine                             | 24.3                    | 43               |                                   |                   |
| Spirits                                | 8.9                     | 30               |                                   |                   |
| Beer                                   | 11.1                    | 48               |                                   |                   |
| Checked cholesterol in the past, y     | 2                       |                  | 5                                 |                   |
| No, %                                  | 10.5                    |                  | 25.3                              | 10.7              |
| Total cholesterol, mg/dL               |                         |                  |                                   |                   |
| <200                                   | 65.5                    |                  |                                   | 56.8              |
| 200–239                                | 20.3                    |                  |                                   | 24.8              |
| ≥240                                   | 2.9                     |                  |                                   | 5.6               |
| History of CAD or VDx                  | 1.6                     | 4.0              | 3.3                               | 2.1               |
| Family history of premature CAD        | 20.5                    | 23.0             |                                   |                   |
| History of hypertension                | 17.1                    | 14               | 26.4                              | 20.8              |
| History of diabetes mellitus           | 2.7                     | 0.6              | 7.9                               | 4.0               |
| History of dyslipidemia                | 14.9                    | 28               | 35.7                              | 24.5              |
| History of depression                  | 13.3                    |                  |                                   | 14.2              |
| Medication use                         |                         |                  |                                   |                   |
| Aspirin use                            | 17.9                    | ~38              |                                   | 28.6              |
| β-Blocker use                          | 7.0                     | ~6               |                                   | 9.1               |
| Omega-3 (fish oils)                    | 19.1                    | ~17              |                                   |                   |
| Statin use                             | 14.1                    | ~30              |                                   | 14.3              |
| Other cholesterol-lowering medications | 4.6                     | ~5               |                                   | 3.6               |

Abbreviations: BMI, body mass index; BRFSS, Behavioral Risk Factor Surveillance Survey; CAD, coronary artery disease; CLS, Cardiologists' Lifestyle Survey; HDL, high-density lipoprotein; LDL, low-density lipoprotein; NHS2, Nurses Health Study 2; PCNA, Preventive Cardiovascular Nurses Association; VDx, vascular disease.

<sup>a</sup>PCNA female members.

<sup>b</sup>American cardiologists—personal health habits of American cardiologists, *Am J Cardiol.* 2006.

<sup>c</sup>Centers for Disease Control and Prevention BRFSS data 2007.

<sup>d</sup>NHS2 cohort 2005 survey respondents, personal communication 2008.

<sup>e</sup>Does not add up to 100% because not all categories of alcohol use were listed.

<sup>f</sup>Not mutually exclusive.

to national databases were difficult, in that there is not one standardized method across studies for reporting risk factors or healthy lifestyle behaviors. Therefore, only sections of the PCNA data could be used for comparisons across various national databases.

Obesity (BMI ≥ 30) was proportionally higher among PCNA nurses (20.4%) than Cardiologists (8%) but was slightly lower than levels reported in NHS2 (26.3%) and BRFSS 2007 survey (25.9%). Nevertheless, our survey data suggests that obesity is a health risk in 1/5 of the PCNA respondents. Under

reporting of weight is common in survey research,<sup>8,9</sup> thus, the obesity risk is likely higher.

The proportion of PCNA respondents reporting no regular physical activity was comparable to that of Cardiologists (12% vs. 11%, respectively) and was markedly lower than the proportion in either NHS2 (19%) or the BRFSS (25%). The proportion of PCNA respondents reporting regular exercise 3 or more times a week was 56% compared with cardiologists (58%), BRFSS (48%), and NHS2 (56%). Overall, a high percentage of PCNA respondents engage in some regular physical activity compared to other populations.

The rate of current cigarette smoking was lowest in cardiologists (1.7%) and PCNA respondents (3.6%) compared with the NHS2 (8%) and the BRFSS women (18%). Current smoking rate reported in a European study of Basel nurses was 15%,<sup>10</sup> similar to the proportion of smokers among BRFSS women (18%). The data suggest that PCNA nurses in the United States have adopted a positive nonsmoking lifestyle.

Dietary factors are also a part of a healthy lifestyle, and healthy dietary recommendations include consuming 5 or more servings of fruits and vegetables a day.<sup>11</sup> Almost 40% of PCNA respondents reported a dietary intake of more than or equal to 3 servings of fruit a day, and almost 50% reported an intake of more than or equal to 3 servings of vegetables a day, suggesting that almost half of PCNA nurses do consume at least 5 servings of fruits and vegetables a day. There are little comparative data examining dietary factors, but NHS2 reports almost a 29% consumption of more than or equal to 5 servings of fruits and vegetables a day (data not shown). A heart healthy lifestyle also recommends 2 servings of fish a week.<sup>11</sup> More than 40% of PCNA respondents reported consumption of fish at least once a week, and 24% reported 2 servings of fish a week. Fish intake, particularly oily fish high in omega-3 fatty acids, has been linked to lower risk of heart disease and sudden death.<sup>11</sup> Interestingly, about 20% of PCNA respondents reported using omega-3 supplements. Healthy dietary recommendations also advise that, if alcohol is consumed, it should be limited to no more than 1 drink a day for women.<sup>11</sup> Among PCNA respondents, 23% reported no alcohol intake, 8% reported intake of more than or equal to 1 to 2 drinks per day, and most reported consuming less than 1 drink a day. Our survey data suggest that almost half of PCNA respondents have adopted healthy dietary practices.

Personal health habits related to diet, exercise, and cigarette smoking are key components of a healthy lifestyle and integral to the primary prevention of CVD. However, other factors such as personal

medical and family history also contribute to one's risk for heart disease.<sup>12,13</sup> A history of hypertension was lower among PCNA respondents (17%) compared to NHS2 (21%) and BRFSS women (26%) and was slightly higher than that reported by cardiologists (14%). A history of dyslipidemia was lowest among PCNA respondents (15%) compared to cardiologists (28%), NHS2 (25%), and BRFSS women (36%). Personal history of CVD or diabetes mellitus was small in all groups (see Table 2).

## Discussion

Prevention is a key strategy, as communities worldwide mount risk reduction and health promotion programs to address the epidemic of CVD. Nurses, along with all healthcare professionals, must be at the forefront of these programs. Preventive Cardiovascular Nurses Association is a nursing organization dedicated to preventing CVD through assessing risk, facilitating lifestyle changes, and guiding individuals to achieve treatment goals. Results from this study show that PCNA members are well positioned to lead this effort. Most notable are the favorable lifestyle practices related to smoking habits, exercise routines, and healthy eating patterns as compared to databases of general nurses (NHS2) and women (BRFSS). Teaching health promotion is a core competency for today's nurse. However, in a professional group so deeply committed to health promotion, nurses do not always make the best role models. It is challenging to determine with accuracy the current incidence of smoking among nurses. Anecdotally, nurses have long been unfavorably viewed as a group with high smoking rates.<sup>14</sup> "Tobacco Free Nurses," the first national program focused on helping nurses and student nurses to stop smoking, estimated the rate of smoking among nurses at 18%.<sup>15</sup> In our sample of PCNA nurses, a significantly low reporting of tobacco use was noted (3.6%). It is possible that nurses with positive health habits self-select to work in areas such as prevention where fostering healthy behaviors is a primary role expectation.

The rate of overweight (27%) and obesity (20%) for women in the PCNA study, although similar to the comparison groups of women, suggests an area of increased cardiovascular risk. With the mean age of the sample participants at 47 years, the anticipated postmenopausal weight gain may further increase this finding. The complexities of obesity and the challenges of weight loss are well known. It is not known if the effectiveness of teaching others about the health risks of obesity is altered when the nurse educators are overweight or obese themselves. A recent study by Miller et al<sup>16</sup> examined knowledge of obesity and associated health risks among a

sample of self-reported overweight/obese nurses. Significant areas of knowledge deficits regarding health consequences were identified; for example, most (96%) could identify CVD as a negative outcome of obesity, however, 26% did not identify diabetes, and 90% omitted hyperlipidemia as a health consequence. Moreover, more than half reported that they personally lacked the discipline to make healthy behavior choices. This signals important opportunities for continuing education regarding obesity health implications and strategies for effective weight loss.

Another surprising aspect of this survey was the high rate of general life and workplace stress experienced by the PCNA respondents. Almost 60% of all respondents report moderate to high levels of general life (58%) and workplace (62%) stress. Many factors contribute to this stress in today's complex environment, and mounting stress does have a negative impact on physical health. Being stressed certainly makes it more difficult to engage in health-promoting activities such as weight loss, wherein too often, food serves as a coping mechanism for the stress. Whether job stress is a risk for CVD is controversial<sup>17,18</sup>; however, the high levels raise the concerns of burnout and migration to other occupations, further diminishing the nursing workforce.<sup>19</sup> Learning successful stress management techniques may be warranted for this population of nurses and women.

There is growing evidence that a family history of premature heart disease is associated with increased risk for heart disease after accounting for traditional cardiovascular risk factors.<sup>20-22</sup> Furthermore, some studies have found that the risk is higher for young women compared to young men. The Dallas Heart Study, a population-based study of asymptomatic persons aged 30 to 50 years, found that more women reported a family history of premature myocardial infarction compared with men (12.4% vs 9.3%,  $P = .014$ ).<sup>21</sup> Women with a family history of premature myocardial infarction had more cardiovascular risk factors and higher odds of having coronary artery calcification compared to men (odds ratio [OR] of 2.0, 95% confidence interval [CI] of 1.0-4.1 and OR of 1.7 and 95% CI of 0.9-3.2, respectively),<sup>21</sup> and women were less aware of their personal CVD risk. Another population study of asymptomatic persons found that those with a family history of premature heart disease tended to be younger, be female, and have risk factors including hypertension obesity and cigarette smoking.<sup>22</sup> In the Framingham Offspring Study,<sup>23</sup> the overall prevalence of parental premature CVD was 21.6%. In our study, a family history of premature CAD was similar in PCNA respondents (21%) and cardiologists (23%) and is consistent with the Framingham offspring data. In

the subset of PCNA women with a family history of premature heart disease, 20% reported a history of hypertension, 23% reported a history of dyslipidemia, and 17% were obese ( $BMI \geq 30$ ). Our data would suggest that nurses with a positive family history of premature heart disease should apply more emphasis on reducing their cardiovascular risk factors and on achieving a healthy body weight.

Several limitations should be noted with respect to this study. The rate of participation in the survey could not be accurately estimated since the survey was conducted via e-mail; it was not possible to determine if e-mail addresses were valid, messages were received, or members declined to participate. Although there is limited information about response rates using e-mail strategies, one review found an average response rate of 31% among studies conducted during the 1990s. Our estimated response rate of 26% compares favorably.<sup>24</sup> We did use strategies such as early notification, reminders, and incentives to maximize the survey responses. Because of the anonymous nature of this survey, we were unable to compare respondents to nonrespondents. It is likely that those with an unfavorable lifestyle would be less likely to respond. As with all survey data, the ascertainment of personal lifestyle habits and medical history is subject to recall bias and to concerns of accuracy with self-reported data. These factors may be important in interpreting data with respect to weight, a sensitive lifestyle issue for women and one that is commonly underreported. Nevertheless, comparisons with other national samples suggest that the data are reasonable, and there is some research suggesting that e-mail surveys elicited more candid responses compared to mailed surveys.<sup>24</sup>

## Summary

We found that the PCNA women have more favorable healthy lifestyle profiles compared with other national samples of women. More than 50% have a healthy BMI ( $<25$ ), more than 95% are not cigarette smokers, and more than 56% achieve the recommended levels of physical activity. Preventive Cardiovascular Nurses Association members do report cardiovascular risks. More than 17% report a history of hypertension, more than 15% report a history of dyslipidemia, and more than 20% report a family history of premature CVD. The rates of hypertension and dyslipidemia are lower than rates reported in other national samples; however, the rate for family history of premature heart disease was similar to those reported in national samples and may indicate a target for prevention programs for nurses.

### What's New and Important

Compared to other populations, PCNA member women have a more favorable profiles compared to other national samples of women, with:

- lower rates of smoking,
- higher exercise levels,
- more healthy eating practices, and
- lower rates of hypertension and dyslipidemia

Lifestyle and risk factors of concern include the following:

- high rates of obesity,
- high rates of general life and workplace stress, and
- prevalence of a family history of premature CAD.

Because nurses serve role models for patients about healthy lifestyles and cardiovascular risk reduction, nurses should employ prevention efforts targeting their own risks factors. Our survey results suggest that risks related to a healthy weight and a premature family history of heart disease would be particularly important.

As noted in an article by Connolly et al,<sup>25</sup> "Nurses are selling a product, and that product is health. The best salespersons are those who are genuinely committed to their product and model its benefits." Therefore, it is important that nurses realize that their own health practices can have a profound effect on the consumers of their services. Nurses share a professional commitment to provide education and to advocate for and to role model healthy lifestyles. Yet, some nurses struggle with having to make the same healthy behavior changes as their patients. When needed, nurses should use available programs to assist them in changing their own risky behaviors. However, based on the findings of this study, PCNA members seem well positioned to lead the effort of cardiovascular risk factor and lifestyle modification.

### Acknowledgments

The authors thank Dr Diane Feskanich, assistant professor, Harvard Medical School, for assistance in compiling comparative data from the Nurses Health Study 2. They also thank all the PCNA members who completed the survey.

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