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Gender disparities in patient education provided during patient visits with a diagnosis of coronary heart disease

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Abstract

Background: Cardiovascular disease is the leading cause of death in females in the United States. Prior studies have reported that females receive less patient education and preventive counseling for cardiovascular disease as compared with males. The American Heart Association and others have embarked on several initiatives over the last 20 years to narrow this disparity of care. The primary objective of this study was to determine whether a gender disparity remains in the provision of patient education among patients diagnosed with coronary heart disease, a form of cardiovascular disease. The secondary objective was to determine whether there is an association between the provision of patient education and sociodemographic variables and risk factors.

Methods: This was a retrospective, cross-sectional, observational study of adults (⩾18 years) diagnosed with coronary heart disease who participated in National Ambulatory Medical Care Survey between the years 2005 and 2014, inclusive. Chi-square tests of independence were performed to address the primary objective. A multivariable logistic regression model was constructed to assess the association between gender and provision of patient education while adjusting for sociodemographic variables and risk factors of interest.

Results: A total raw survey sample size of 17,332 patient visits meeting the study inclusion/exclusion criteria was utilized. Patients were predominately white, male, non-Hispanic, and ⩾75 years of age. Females had 0.86 times the odds of receiving patient education compared with males (95% confidence interval = 0.78–0.95, p = 0.0024). After adjusting for covariates of interest, gender remained statistically significant in the multivariable logistic model. In addition, the variables "other payer" (vs private insurance), tobacco use, primary care physician type, obesity, hyperlipidemia, and hypertension were found to be statistically significantly associated with the provision of patient education ($p < 0.05$) in the multivariable analysis.

Conclusion: In the data analyzed, gender disparities exist, as evidenced by a greater proportion of males receiving patient education than females, among coronary heart disease patients during visits seeking medical care. The acceptability of these findings in terms of overall patient management and treatment goals requires further evaluation.

Keywords

coronary heart disease, counseling, disparity, education, gender

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Introduction

Cardiovascular disease (CVD) remains the leading cause of death among women in the United States. In 2015, approximately 22.3% of female deaths and 24.4% of male deaths in the United States were attributable to CVD.[1] Nevertheless, the risk of CVD in women is often underestimated due to the misperception that females are "protected" against CVD.[2]

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Awareness of CVD as the primary cause of mortality in women has slowly increased over the past two decades but has recently plateaued. In 1997, approximately 30% of American women surveyed were aware that CVD was their leading cause of death, and this increased to 54% in 2009, with little change in awareness when last surveyed in 2012.[3] The lack of awareness by women is troubling and represents a challenge to effective and timely patient management. In addition, several studies have shown that women receive suboptimal CVD preventive care as evidenced by adherence to CVD guidelines and potentially poorer outcomes compared with men.[4,5]

The American Heart Association (AHA) began releasing women-specific clinical recommendations for prevention of CVD starting in 1999.[6] The guidelines were updated in the years 2004,[7] 2007,[8] and most recently in 2011.[9] The 2004 AHA update included gender-specific CVD guidelines for preventive care to lower women's risk for CVD and included recommendations for coronary heart disease (CHD).[7] However, secondary to nonadherence, the 2011 AHA update re-emphasized the need to better assess women's risk factors in order to provide the appropriate preventive care.[9]

Preventive care and risk assessment are important considerations in improving health outcomes in people at-risk for CVD, both men and women. The risk factors of CVD are fairly well recognized and include hypertension, diabetes mellitus, smoking, obesity, family history of CVD, elevated total cholesterol, elevated low-density lipoproteins, low high-density lipoproteins, elevated triglycerides, and a sedentary lifestyle. Other risk factors include age, decreased estrogen levels, unhealthy diet, alcohol consumption, and psychosocial factors. Many of the modifiable risk factors are similar in men and women, though some risk factors affect females more than males, and females tend to develop CHD approximately 7–10 years later than males.[3,10] Nevertheless, studies have shown that women receive less CVD preventive care in comparison to men in regards to education and counseling on appropriate modification of these risk factors.[4,11,12] These modifiable risk factors include physical inactivity, obesity, tobacco use, and diabetes mellitus.[13]

The 2011 update of the AHA Guidelines re-emphasized the need to focus on the evaluation of a woman's CVD risk and directly address identifiable risk factors.[9] The concept of "ideal cardiovascular health" was defined by the absence of clinical CVD and the presence of ideal levels of total cholesterol, blood pressure, fasting blood glucose, and adherence of healthy behaviors and lifestyle. The healthy behaviors included a lean body mass index (BMI) ($<25\,kg/m^2$), abstinence from smoking, recommended levels of physical activity, and a healthy diet. The updated guidelines state that improving cardiovascular health in women will require the dissemination and implementation of lifestyle and treatment interventions, including educational practices to effect behavior change and adherence to therapies.[9]

CVD is the proper general term for all types of diseases that affect the heart or blood vessels and includes CHD, which can progress to unstable angina and myocardial infarction. CHD, also known as coronary artery disease or ischemic heart disease, is a form of CVD. CHD develops when the coronary blood vessels are partially or completely obstructed by atherosclerotic plaque.[14,15] When the coronary arteries are partially or completely blocked or damaged due to atherosclerosis, there may be a decrease in blood flow and a subsequent lack of oxygen and nutrient supply to the heart. This ultimately may lead to myocardial ischemia, angina, myocardial infarction, and death.[15]

This study was designed to examine the association between gender and the provision of patient education on several modifiable risk factors common among men and women diagnosed with CHD using data obtained from the National Ambulatory Medical Care Survey (NAMCS).

Methods

A retrospective, cross-sectional, observational study using data from the NAMCS datasets were developed. The NAMCS is an annual survey under the purview of the Centers for Disease Control and Prevention (CDC) and designed to provide objective, reliable information about the provision and use of ambulatory medical care services in the United States. The NAMCS utilizes a national probability sample of visits made to the offices of non-federally employed physicians classified by the American Medical Association or the American Osteopathic Association as providing primarily office-based, patient care.[16]

A study team that consists of physicians and non-physician clinicians including nurse practitioners and physician assistants from the United States collects NAMCS data. Physicians in the specialties of anesthesiology, pathology, and radiology are excluded. The total physician sample is divided into 52 random subsamples approximately equal in size, with each subsample randomly assigned to 1 of the 52 weeks in a year. Each physician systematically selects a random sample of visits during an assigned reporting week and then each physician, physician support staff, or the US Census Bureau's field representatives perform data collection. The data collected includes patient symptoms, diagnoses, medications, procedures, planned treatment, demographic, socioeconomic, dietary, and other health-related information. A random sample of these logged visits from the reporting week is then selected for inclusion in the database. The NAMCS is approved by the Ethics Review Board of the National Center for Health Statistics (NCHS), with waivers of the requirements to obtain informed consent from patients and patients' authorization of the release of medical-record data by health care providers. Data processing, including all medical and drug coding, are performed by Society of Research Administrators (SRA) International, Inc. (Durham, North Carolina) and subjected to quality-control procedures.[16]

NAMCS datasets from the years 2005–2014 (inclusive) were included in the study. Data from patients $\geqslant$18 years of age and having a primary diagnosis of CHD according to the International Classification of Diseases, Ninth Revision codes 410-414 (ICD-9) were included. If no ICD-9 code designating a primary diagnosis of CHD existed, the patient visit was included if ischemic heart disease was indicated in the NAMCS data collection form. For eligible visits, information was included on patient age, gender, race, ethnicity, payment type, metropolitan status area (MSA), tobacco use, BMI category, and physician type. The presence of individual patient risk factors of obesity, diabetes, hyperlipidemia, and hypertension was also included for analysis. Office-based provision of the four NAMCS patient education variables: diet/nutrition, exercise, tobacco use/exposure, and weight reduction was utilized to construct the study endpoint.

The endpoint of all analyses was "the provision of patient education." The physician or office-based staff reports the provision of patient education, which can be found in the NAMCS datasets. This endpoint was constructed by combining the four NAMCS education variables into one joint variable: diet/nutrition, exercise, tobacco use/exposure, and weight reduction. A positive response in the survey to the receipt of any one or more of the four types of education was considered as patient education received. The collected NAMCS data were analyzed using the sampled visit weight, which represented the product of the corresponding sampling fractions at each stage in the sample design. The sampling weights were adjusted by NCHS for survey nonresponse as appropriate within the database, yielding a nonbiased national estimate of visit occurrences, percentages, and characteristics. Consistent with the multi-stage, cluster-sampling methods used in NAMCS, all analyses were weighted and clustered to extrapolate results to generate average annual US national estimates. That is, the analysis of the survey, as designed, allows for the generation of national average annual ambulatory care visit totals for the years 2005–2014 by extrapolation of the survey sample (n = 17,332).[17–19]

Rao-Scott chi-square (χ^2) tests were used for determining whether the proportions of adult patients with CHD that received patient education differed between genders. Odds ratios (ORs), corresponding 95% confidence intervals (CI), and p-values are reported.

A multivariable logistic regression model was constructed to evaluate the predictive value of each independent variable, adjusting for covariates of interest, on receipt of patient education. As a primary model filter, only variables with an overall χ^2 test $p < 0.2$ were included in the multivariable model. ORs with corresponding 95% CIs for each level of each variable included in the model, in comparison to each variable's reference group, were generated and reported. The sociodemographic variables included in the model were grouped for analysis as shown in Table 1. Per NCHS recommendations, any variable with a survey estimate based on <30 records, with a >30% missing data or a relative standard error (RSE) of >30%, was excluded from the analyses due to potential unreliability. As this was a retrospective, hypothesis generating type of study, no adjustments for multiple comparisons were made, and p-values <0.05% and 95% CIs for ORs that did not contain the value "1" were considered statistically significant. All analyses were generated using SAS version 9.3.[20]

Sampling errors were determined using the SAS SURVEYFREQ and SURVEYLOGISTIC procedures, which take into account the clustered nature of the sample. The appropriate SAS procedure options (NOMCAR and DOMAIN) to address missing data and use of domains to determine accurate variance estimates were implemented in the analyses as recommended by the NCHS.[17–19] The data for analyses were de-identified and cleaned by the CDC prior to release. Due to the data sources used being publicly available and de-identified, an exemption from the Campbell University Institutional Review Board was received.

Results

Across the 10 years included, 17,332 visit records from the NAMCS database met the inclusion criteria. Table 1 depicts the demographics of the patients at the time of their visit. The majority were males (59.3%), predominantly white (88.5%), and not Hispanic/Latino (90.9%). The mean age (±SD) was 70 (±12) years. The most common payment type was Medicare (62.5%), and most visits occurred at physician's offices in an MSA (87.9%). Most did not report current use of tobacco (84.6%) and were not obese (88.3%). With respect to comorbidities, 11.7% reported diabetes mellitus, 53.1% hyperlipidemia, and 68.8% hypertension (Table 1).

The primary analysis demonstrated that physician office visits for females had 0.86 times the odds of receiving patient education compared with physician office visits for males (95% CI = 0.78–0.95; p = 0.0024). Overall, 22.3% of female visits reported provision of patient education and 25.0% of male visits reported patient education (Table 2).

The multivariable logistic regression model to analyze the provision of patient education revealed that following the adjustment for variables of interest, gender remained significantly associated with patient education. In addition, the following variables were found to be significantly associated with the provision of patient education: insurance type, seen by primary care physician, tobacco use, obesity, hyperlipidemia, and hypertension. The odds of receiving patient education remained significantly less for female visits as compared with male visits (OR = 0.85; 95% CI = 0.74–0.97; p = 0.0160). Visits with a payment

Table 1. Demographics and patient characteristics.[a]

Characteristic	Number (%) of patient visits N = 17,332[b]
Age, year (mean ± SD)	70 ± 12
45–64	11,237,979 (27.7)
65–74	12,048,804 (29.6)
⩾75	16,251,612 (40.0)
18–44	1,103,867 (2.7)
Gender	
Female	16,561,364 (40.7)
Male	24,080,898 (59.3)
Race group	
Black	2,515,720 (7.6)
Other	1,301,058 (3.9)
White	29,501,267 (88.5)
Ethnicity	
Hispanic/Latino	2,970,485 (9.1)
Not Hispanic/Latino	29,752,816 (90.9)
Payment type	
Medicare	25,089,222 (62.5)
Medicaid/SCHIP	2,074,866 (5.2)
Other[c]	1,898,085 (4.7)
Private insurance	11,062,791 (27.6)
MSA	
Not MSA	4,908,913 (12.1)
MSA	35,733,349 (87.9)
Tobacco use	
Current	4,735,473 (15.4)
Not current	26,089,957 (84.6)
Seen by primary care physician	
Yes	23,022,745 (58.7)
No	16,167,520 (41.3)
Obesity	
Yes	4,763,887 (11.7)
No	35,878,374 (88.3)
Diabetes	
Yes	12,252,407 (30.1)
No	28,389,854 (69.9)
Hyperlipidemia	
Yes	21,580,782 (53.1)
No	19,061,479 (46.9)
Hypertension	
Yes	27,945,373 (68.8)
No	12,696,889 (31.2)

SD: standard deviation; MSA: metropolitan statistical area; SCHIP: State Children's Health Insurance Program.
[a]Survey weighting and clusters accounted for reflecting unbiased, national average annual estimates of ambulatory care visit occurrences for the portion of the population meeting the study inclusion/exclusion criteria. Reference groups are listed last for each variable.
[b]Raw, unweighted survey sample size from which the weighted estimates included in this table were extrapolated.
[c]Includes workers' compensation, self-pay, charity/no charge, other, and unknown.

type of "other" versus private insurance (OR = 0.69; 95% CI = 0.49–0.96; $p = 0.0289$), and visits with a primary care physician versus other physician type (OR = 0.62; 95 CI, 0.52–0.75; $p < 0.0001$) had significantly lower odds of receiving patient education. In addition, visits by current tobacco users (OR = 2.05; 95% CI = 1.69–2.49; $p < 0.0001$), those obese (OR = 2.60; 95% CI = 2.13–3.15; $p < 0.0001$), with hyperlipidemia (OR = 1.66; 95% CI = 1.42–1.95; $p < 0.0001$), and hypertension (OR = 1.28; 95% CI = 1.11–1.48; $p = 0.0007$) had significantly higher odds of receiving patient education at the time of their visit. Per the model filter described in the methods, race, ethnicity, and MSA were excluded from the model. All other variables in the model were found to be not significantly associated with the provision of patient education (Table 3).

Discussion

CVD, including CHD, has traditionally been considered a disease that primarily afflicts males.[4] Nevertheless, CVD remains the leading cause of death in women in the United States according to the latest National Vital Statistics Report.[21] The AHA has been very active in promoting the need to better address the risk of CVD in women to improve preventive care and management.[9]

Our results demonstrate the proportion of females that received patient education was significantly less than the proportion of males that received patient education, even after adjusting for covariates of interest. This is despite the fact the years of survey data used in our study were after the release of the 2004 AHA Guidelines that contained gender-specific CVD guidance to lower women's risk for CVD and included recommendations specific for CHD.[7] While our findings support the recommendations and guidance of the AHA, the finding that the proportion of females that received patient education was significantly less than the proportion of males, even after adjusting for covariates of interest, provides evidence that more deliberate and intentional effort needs to be performed in closing the gender gap in patient counseling at the provider level at the time of patient visit. Furthermore, all patient visits in our study were in individuals with established CHD. Counseling these patients could theoretically slow the progression of disease and further empower the patient to accept greater equity in their personal health management. It is also reasonable to project improving counseling compliance could lead to potential improvements in quality-of-life, better compliance to treatment regimens, and a reduction in unnecessary healthcare resource utilization.

Our findings are consistent with other reports that indicated females received suboptimal preventive counseling for CVD. Yoon et al.[22] assessed the provision of clinical preventive services to patients at-risk and not at-risk for development CVD. Yoon et al. used the NAMCS as their data source, and patients with hypertension, hyperlipidemia, obesity, or diabetes were categorized as at-risk for CVD. As expected, clinical preventive services were more likely to be provided for at-risk patients compared with patients not at-risk for CVD. However, the investigators

Table 2. Primary analysis.[a]

Gender	Patient education Yes N (%)	Patient education No N (%)	OR (95% CI)	p-value
Female	3,687,093 (22.3)	12,874,271 (77.7)	0.86 (0.78–0.95)	0.0024
Male	6,015,516 (25.0)	18,065,383 (75.0)		

OR: odds ratio; CI: confidence interval.
[a]Survey weighting and clusters accounted for reflecting unbiased, national average annual estimates of ambulatory care visit occurrences for the portion of the population meeting the study inclusion/exclusion criteria. Reference group is listed last.

Table 3. Multivariable logistic regression model for patient education.[a]

Predictor variable	OR (95% CI)[c]
Gender (female vs male)	**0.85 (0.74–0.97)**
Age (45–64 vs 18–44 years)	1.38 (0.96–1.97)
Age (65–74 vs 18–44 years)	1.16 (0.77–1.75)
Age (⩾75 vs 18–44 years)	0.91 (0.61–1.36)
Payment type (Medicare vs private)	1.00 (0.82–1.21)
Payment type (Medicaid/SCHIP vs private)	0.78 (0.58–1.07)
Payment type (other[b] vs private)	**0.69 (0.49–0.96)**
Tobacco use (current vs not current)	**2.05 (1.69–2.49)**
Seen by primary care physician (yes vs no)	**0.62 (0.52–0.75)**
Obesity (yes vs no)	**2.60 (2.13–3.15)**
Diabetes (yes vs no)	1.56 (0.99–1.35)
Hyperlipidemia (yes vs no)	**1.66 (1.42–1.95)**
Hypertension (yes vs no)	**1.28 (1.11–1.48)**

OR: odds ratio; CI: confidence interval; SCHIP: State Children's Health Insurance Program.
[a]Survey weighting and clusters accounted for reflecting unbiased, national average annual estimates of ambulatory care visit occurrences for the portion of the population meeting the study inclusion/exclusion criteria. Reference groups are listed last for each variable. The race, ethnicity, and metropolitan status variables were excluded from the model. Boldface indicates statistical significance at the 0.05 level.
[b]Other includes workers' compensation, self-pay, charity/no charge, other, and unknown.
[c]Boldface indicates statistical significance at the $p < 0.05$ level.

found at-risk patients were counseled differently according to their gender. Physicians were more likely to report prescribing or recommending the continuation of aspirin therapy to male patients. This was despite the US Preventive Services Task Force (USPSTF) guidelines,[23] in place at the time of the study, which recommended at-risk females be prescribed aspirin therapy. The investigators also found males were significantly more likely to be advised to have cholesterol screening than females. However, this latter finding may have been partially attributable to clinicians following the USPSTF guidelines for lipid screening that were less aggressive for females.[24]

We also found several other variables associated with provision of patient education. Tobacco use, presence of obesity, hyperlipidemia, hypertension, type of physician seen, and payment type were strong predictors of providing patient education. These variables may be classified into two distinct groups to assist in interpretation. The first group would represent clinical factors and include tobacco use, obesity, hyperlipidemia, and hypertension. Each of these factors either places an individual at-risk, or compounds the risk, for deleterious outcomes. Considering that our patient population was limited to patients previously diagnosed with CHD, our results are not surprising. One would expect the presence of any of these clinical characteristics to receive patient counseling to either obviate or mitigate the risk factor.

The second group of variables that were found to demonstrate differences in patient counseling can be considered as non-clinical and includes whether the patient was seen by a primary care physician and the nature of payment type at the time of visit. Our results also indicated that patient visits occurring at the primary care physician office were also less likely to receive education than other health care provider locations. Unfortunately, our results do not have specifics as to the types of physicians categorized as "other," however, the finding remains significant and points to a potential area for improvement.

Our findings for provider type are consistent with a report from Mosca et al.[4] from the results of an online survey of 500 randomly selected physicians. The physician cohort was comprised of 300 primary care physicians, 100 obstetricians/gynecologists, and 100 cardiologists. The investigators used a standardized questionnaire to assess the awareness, adoption, and barriers to national CVD prevention guidelines. Participants were provided 10 patient cases with information about age, sex, ethnicity/race, smoking status, total cholesterol, low-density lipoprotein (LDL) cholesterol, high-density lipoproteins (HDL) cholesterol, triglycerides, blood pressure, treatment for hypertension, BMI, family history of CHD, and personal history of CHD or diabetes mellitus. Physicians then utilized the Framingham risk score methodology to produce a risk categorization. The investigators determined that women were significantly more likely to be assigned to a lower-risk category by primary care physicians than men despite identical risk profiles ($p < 0.0001$). Significantly, fewer primary care providers were aware of the AHA Evidence-based

Guidelines for Women when compared with cardiologists (~62% vs 80%; $p < 0.001$). Among the primary care physicians that reported they were aware of the AHA Evidence-based Guidelines for Women, the self-reported incorporation of the guidelines was essentially equal to that of cardiologists (~38% vs 42%; p=NS).

Our finding of the association of provision of patient education with the payment type variable is more challenging to understand. Payment type comparisons of Medicare versus private, Medicaid/State Children's Health Insurance Program (SCHIP) versus private, and other versus private were included in the multivariate model; however, only other versus private remained statistically significant. According to the NAMCS survey documentation, the "other" category included workers' compensation, self-pay, charity/no charge, other, and unknown. The influence of payment methods has been the subject of other studies and the association with the provision of patient education is inconsistent. Yoon et al.[22] found patients with Medicare/Medicaid or no insurance were less likely to have cholesterol screening than patients with private health insurance. The inconsistency in these results suggest further study with consideration to the changing paradigms of governmental legislation, consumer choice, and eligibility for various forms of payment coverage. Nevertheless, the ability of a patient to pay for their provider visit may have an impact on educational and preventive care.

The clinical implications of our study are multi-faceted. A broader understanding and acceptance of the AHA guidelines to minimize risk in women is important, if not imperative. The identification and assessment of barriers to the adherence of the AHA guidelines is warranted. Potential solutions designed to eliminate educational barriers into routine clinical practice should be vetted and integrated into practice. Quality improvement activities utilizing existing technologies to capture and document appropriate interventions to minimize CVD risk along the continuum of healthcare should produce health and economic benefits to the patient, family, healthcare professionals, and payers of healthcare.

Our study is not without limitations. A patient may encounter several healthcare professionals during a typical physician office visit, and we were unable to determine the training or background of who was responsible for the provision of patient education and counseling. The severity of CHD was not captured in the NAMCS surveys nor was the magnitude of the modifiable risk factors (physical inactivity, obesity, tobacco use, and diabetes mellitus) assessed. While there are established guidelines calling for patient education, there is no standardized educational program for the patients studied. Furthermore, the cross-sectional, observational nature of our study does not allow for the assessment of behavior across time or allow for a determination of cause and effect. Nevertheless, these results are important to optimize an approach to the management of CVD, including CHD. This approach begins with education, preventive care, and risk modification.

The World Health Organization states that equity in healthcare provision ensures every person shall have the right to attain his or her fullest health potential and that no person should be disadvantaged from achieving that potential.[25] Enhancing awareness of women's risk for CVD may assist in achieving such equity. Our results should serve as an important reminder to remain vigilant in providing education to CHD patients regardless of gender.

Conclusion

Among the overall population of CHD sufferers, a greater proportion of males, when compared with females, are receiving patient education related to managing cardiovascular risk. While patients with concomitant obesity, hyperlipidemia, hypertension, or use tobacco are more likely to receive patient education during their medical care visits, the gender disparity previously reported in the literature appears to be persistent. Further study and efforts to close this gender gap in clinical practice are warranted.

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