



Original article

Evaluation of the *Heart Truth* Professional Education Campaign on Provider Knowledge of Women and Heart Disease

Deborah B. Ehrenthal, MD, MPH^{a,b,*}, Suzanne G. Haynes, PhD^c, Kristen E. Martin, BA^d, Jeanne A. Hitch, MEd, MA, LPC^e, Sonya Feinberg Addo, MPH^a, Elizabeth O'Neill, BA^a, Ileana L. Piña, MD, MPH, FAHA, FACC^f, Ann M. Taubenheim, PhD, MSN^g, Nancy L. Sloan, DrPH^a

^a Christiana Care Health System, Newark, Delaware

^b Jefferson Medical College, Thomas Jefferson University, Philadelphia, Pennsylvania

^c Office on Women's Health, U.S. Department of Health and Human Services, Washington, DC

^d Research Center for Stroke & Heart Disease, Jacobs Neurological Institute, State University of New York at Buffalo, Buffalo, New York

^e Frances Payne Bolton School of Nursing, Case Western Reserve University, Cleveland, Ohio

^f Albert Einstein College of Medicine, Montefiore Medical Center, 111 East 210th Street, Bronx, New York

^g Office of Communications, National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland

Article history: Received 3 October 2012; Received in revised form 18 January 2013; Accepted 18 January 2013

A B S T R A C T

Background: The *Heart Truth* Professional Education Campaign was developed to facilitate education of health care providers in evidence-based strategies to prevent cardiovascular disease (CVD) in women.

Methods: As part of the 3-year campaign, lectures based on the American Heart Association's evidence-based guidelines for CVD prevention in women were presented by local speakers to healthcare providers and students in three high-risk states: Delaware, Ohio, and New York. Participants' responses to pretest and posttest questions about CVD in women are presented. We performed *t*-test and multivariable linear regression to assess the influence of provider characteristics on baseline knowledge and knowledge change after the lecture.

Results: Between 2008 and 2011, 2,995 healthcare providers, students, and other participants completed the baseline assessment. Knowledge scores at baseline were highest for physicians, with obstetrician/gynecologists scoring lowest (63%) and cardiologists highest (76%). Nurses had intermediate total knowledge (56%) and students had the lowest total knowledge (49%) at baseline. Pre- and post-lecture assessments were completed by 1,893 (63%) of attendees. Scores were significantly higher after the educational lecture ($p \leq .001$), with greater increase for those with lower baseline scores. Baseline knowledge of the use of statins, hormone therapy, and antioxidants, as well as approaches to smoking cessation and treatment of hypertension, differed by provider type.

Conclusion: Tailoring of lectures for non-physician audiences may be beneficial given differences in baseline knowledge. More emphasis is needed on statin use for all providers and on smoking cessation and treatment of hypertension for nurses, students, and other healthcare professionals.

Copyright © 2013 by the Jacobs Institute of Women's Health. Published by Elsevier Inc.

Introduction

Heart disease is the leading cause of death for women in the United States (Lloyd-Jones et al., 2009). Historically, women have

been less likely than men to receive evidence-based medical interventions for both the prevention and management of heart disease (Chou, Scholle, et al., 2007; Chou, Wong, et al., 2007). Greater attention to gender differences in both prevention and treatment may lead to improved outcomes (Vaccarino, et al., 2009; Canto et al., 2012). In 1999 the American Heart Association (AHA) published the first clinical recommendations for the prevention of cardiovascular disease (CVD) in women (Mosca et al. 1999). This was soon followed by the implementation of *The Heart Truth* campaign for consumers in 2002 by the National Heart, Lung, and Blood Institute, National Institutes of Health, which was expanded in 2004 by the U.S. Department of Health

Supported by contracts HHSP23320082207TC, HHSP23320082208TC, and HHSP23320082209TC, from the U.S. Department of Health and Human Services' Office on Women's Health.

* Correspondence to: Deborah B. Ehrenthal, MD, MPH, Director, Health Services Research for Women and Children, Christiana Care Health System, 4755 Ogletown-Stanton Road, Newark, DE 19718. Phone: 302-733-3966; fax: 302-733-1422.

E-mail address: dehrenthal@christianacare.org (D.B. Ehrenthal).

and Human Services' Office on Women's Health (Pregler et al., 2009) to target healthcare providers.

Since the initial AHA publication, the clinical guidelines have been updated three times, most recently in 2011 (Mosca et al. 2004; Mosca et al., 2011). However, a survey by Mosca and co-workers (2005) found that only 60% of U.S. primary care physicians were aware of the new AHA evidence-based guidelines for prevention of CVD in women. The authors suggested that the gap between evidence and practice could be closed by improving dissemination of the guidelines through provider education. In 2004, the Office on Women's Health piloted *The Heart Truth* Professional Education Campaign to educate primary care providers about CVD in women through grand rounds presentations, case studies, and continuing medical education (CME) programs based on the AHA recommendations. Pregler and colleagues (2009) evaluated the pilot in several Centers of Excellence in Women's Health and found that the campaign's educational intervention improved the knowledge and self-perceived skills of primary care providers.

Because prevention of heart disease is an important function for primary care providers, the professional education campaign was expanded in 2008 in three states with high rates of CVD mortality in women. The campaign was promoted and educational materials and information were disseminated throughout Delaware, Ohio, and New York to a variety of provider audiences. This paper reports the results of the pre- and postintervention assessment of knowledge of healthcare providers attending educational sessions as part of the 3-year tristate *Heart Truth* Professional Education Campaign.

Materials and Methods

Healthcare professionals and students in the health professions were invited to attend a structured, 1-hour CME lecture based on the 2007 AHA evidence-based guidelines for CVD prevention in women and to complete a pretest and posttest evaluation. Most lectures had homogenous audiences (e.g., physicians, nurses). Lectures were tailored for the type of providers by local speakers who selected a subset of the *Heart Truth* slides (available at www.womenshealth.gov/heart-truth) and added information about local CVD outcomes. The pretest and posttest evaluation questions formulated for the 2004 pilot were used as the basis of the evaluation (Appendix; Pregler et al., 2009). Approval for this analysis was obtained from the institutional review boards of Case Western Reserve University, University of Buffalo, and Christiana Care Health System.

The pretest contained questions to elicit demographic information and to assess self-perceived knowledge and preparedness (skills) and objective assessment of knowledge about the AHA guidelines (eight questions). The posttest contained identical knowledge questions and additional questions about the learner's perceived utility of the structured lecture. The knowledge questions covered risk stratification, lifestyle modification, pharmacotherapy, and implications of race and ethnicity in CVD prevention in women. Lecture utility and self-perceived preparedness to provide care were assessed on a 5-point Likert scale.

Physicians were interns, residents, and practicing providers. Each self-identified as family practitioners, general internists, obstetrician/gynecologists (OB/GYNs), cardiologists, and those who trained in other fields. Nurse practitioners (NPs) and physician assistants (PAs) were grouped together because they are each considered to be mid-level providers. The nurse category

included registered nurses but did not include NPs. Students included medical, nursing, pharmacy, and other students in the health professions. Providers were categorized by type, practice location (urban vs. rural), and typical weekly practice volume. Participant gender was not obtained.

Total knowledge score was calculated as the percentage of the eight knowledge questions answered correctly, that is, the number of correct responses divided by eight. Some participants, perhaps those less certain of the correct responses, did not answer all eight questions. Nonresponses (missing answers) were counted as incorrect in the scoring for total knowledge. Participant assessment of utility of the lectures was determined using combined scores 4 (agree) and 5 (strongly agree). Self-perceived preparedness used combined scores of 3 (somewhat prepared), 4 (generally prepared), and 5 (completely prepared).

Paired chi-square and *t*-tests were used to test the significance of the increase in scores from pre- to posttest by provider type. Multivariate linear regression was used to assess the influence of the demographic indices on the percentage of correct total knowledge by provider type at baseline and to estimate the increased knowledge for all participants. Family practitioners were chosen as the physician referent group, because they were the largest group of primary care physicians who participated.

To ensure internal validity, paired analyses were conducted to estimate the effect of the educational intervention for participants who completed both the pre- and posttests. Such analysis may under- or overestimate change, because it excludes providers who departed before posttest completion. Compared with those completing only baseline assessments, slightly more registered nurses, students, and other types of health professionals completed both pre- and posttests than did physicians, NPs, and PAs. However, the baseline knowledge of providers who completed both pre- and posttests was similar to that of those completing only the pretest, suggesting the paired analysis did not bias the results (data not shown but available on request).

Results

Baseline Provider Characteristics

Of the 2,995 healthcare providers who participated in *The Heart Truth* Professional Education Campaign CME events and completed a baseline survey, 46.8% were from Delaware, 30.8% from Ohio, and 22.4% from New York. Approximately equal numbers of physicians (30.6%) and nurses (29.5%) participated; fewer students (12.3%) and NPs/PAs (8.3%). Physicians were family practitioners (43.3%), internists (21.1%), and OB/GYNs (13.4%). The few cardiologists (<2%) were included in the analysis to test the assumption that they were knowledgeable on the subject.

Participant characteristics differed by state (Figure 1). The intervention was solely conducted in urban areas in Ohio, whereas 52% of the New York and 82% of the Delaware sample were urban. More than half of the attendees reported that they worked in a low-volume clinical settings with 25 or fewer patients per week; 75% of this group were not physicians or NP/PAs.

Sixty-three percent (1,893) of participants completed both pre- and posttests. Of these, 13.6% were family practitioners, 6.0% general internists, 1.7% OB/GYNs, 1.6% cardiologists, 4.8% other physicians, 7.4% NP/PAs, 29.3% registered nurses, 16.0%

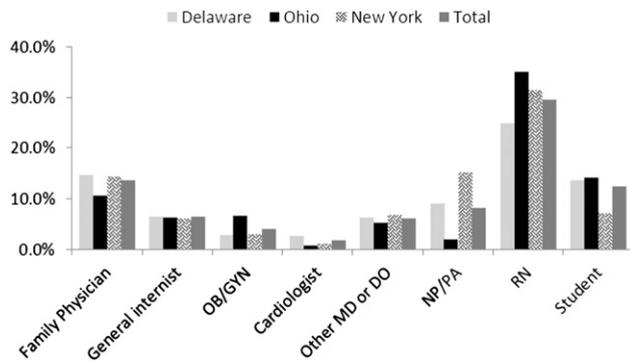


Figure 1. Occupation of participants in *The Heart Truth* Professional Education Campaign by state and overall.

students, 12.8% other, and 6.6% did not specify their area of training.

Provider Total Knowledge before and after the Lectures

There was substantial variation in mean overall test scores across the provider types before the lecture (Table 1). Among physicians, cardiologists had the highest (75.8%) and OB/GYNs the lowest baseline score (63.6%). The mean baseline knowledge score of NP/PAs (64.6%) was greater than for nurses (55.8%); students had the lowest score (48.8%).

The total baseline differences across provider groups remained after adjusting for practice location and patient volume. The total knowledge score for internists were higher ($p = .051$), and for OB/GYN significantly lower ($p < .005$) compared with those of the family practitioners. All other providers scored significantly lower than physicians. There were significant differences in scores by state, but not by urban versus rural setting or patient volume (data not shown).

Mean test scores increased after *The Heart Truth* Professional Education Campaign lecture for all groups (Table 1). Before the lectures, the mean total knowledge score for all professionals ranged from 56% to 76%; after the lectures, the range narrowed from 81% to 89%. The increase in total knowledge score was significant for all groups except the cardiologists, likely reflecting their small sample size and higher baseline score. Nurses, who scored lower at baseline, showed the greatest improvement, increasing from 56% to 81% after the lecture ($p \leq .001$). Total knowledge scores remained the lowest (68%)

Table 1
Overall Knowledge by Specialty, before and after the Lectures

Provider Group	n	Pretest, % Correct (Mean)	Posttest, % Correct (Mean)	Change in Mean Score	p Value
Physicians					
Family practitioner	257	70.1	83.6	13.5	$\leq .001$
General internist	114	73.6	87.3	13.7	$\leq .001$
OB/GYN	33	63.6	88.6	25	$\leq .001$
Cardiologist	31	75.8	86.7	10.9	.07
Other MD/DO	91	66.3	81.3	15	$\leq .001$
NP/PA	140	64.6	84.1	19.5	$\leq .001$
Nurses	555	55.8	81.3	25.5	$\leq .001$
Students	304	48.8	68.0	19.2	$\leq .001$
Total	1893	58.7	78.7	20	$\leq .001$

Abbreviations: MD/DO, physician or osteopathic physician; NP/PA, nurse practitioner or physician assistant; OB/GYN, obstetrician/gynecologist.

for students. The results of the multivariate linear regression analysis indicated that the total knowledge score for the entire group improved by an average of 43% ($p \leq .001$) after adjusting for the provider group.

Provider Knowledge before and after the Lectures by Specific Content Area

CVD risk factors

Baseline knowledge of factors that place women at high risk (>20% over 10 years) for a CVD event was high for the providers overall (89%), and 94% after the lecture (Table 2). Similarly, baseline knowledge that African-American women are most likely to die from heart disease was high overall (77%) and for each group, and 91% after the educational lecture. The response of 54% providers before the lecture indicated they were not aware that African-American, Latina, and Asian-American women are at increased risk for type 2 diabetes. After the lecture, 79% answered this correctly.

Use of medications for CVD prevention in women

Baseline knowledge scores were lowest for questions about statin use, with marked variation by provider specialty. Among physicians, cardiologists scored highest (64%) and OB/GYNs the lowest (23%) on this question. Nurses (20%) and students (17%) had the lowest scores. Knowledge scores about statin use to prevent CVD events in women improved following the lecture by more than 25% overall; this was significant ($p \leq .001$), except among cardiologists (10% increase, not significant), who had higher pre-lecture scores. With the exception of cardiologists, the post-lecture knowledge scores of providers (excluding students) ranged from 53% to 69%. Most participants changed their initial selection to the correct response that statins should be used to lower low-density lipoprotein levels in women who have diabetes. However, 26% continued to believe that statins are less effective in preventing coronary events in women than men and that women with CVD should receive lifestyle therapy first, with statin therapy initiated only if lifestyle therapy fails.

Scores reflecting awareness of current recommendations against the use of hormone therapy (HT) and antioxidant vitamin supplements for CVD prevention ranged from 38% to 88% before the educational lecture, with physicians having the highest scores. This was the only knowledge indicator for which cardiologists had lower baseline scores (77%) than family practitioners, general internists, and OB/GYNs (85%–88%). After the lecture, all participants, except students, had scores ranging from 83% to 97% ($p \leq .001$). Cardiologists had similar knowledge improvement regarding recommendations against HT and antioxidant vitamin supplements (10%) as family practitioners, general internists, and OB/GYNs.

There also was relatively poor baseline knowledge about facts related to medical and behavioral strategies to manage hypertension in women (59%). After the educational lecture, physicians' scores were all 80% or lower, except for cardiologists' (74%). After the lecture, only students had knowledge scores below 70%. Nurses' knowledge increased from 59% to 80% ($p \leq .001$).

Other prevention strategies

There was relatively poor baseline knowledge about facts related to smoking cessation (52%). OB/GYNs had the greatest post-lecture increase in knowledge, from 59% to 94%; among

Table 2
Paired Pre- and Posttest Knowledge Scores by Specialty: Percentage Correct (Pre- vs. Post- Score) Differences for All Specialties

	Family Practitioner	General Internist	OB/GYN	Cardiologist	Other MD/DO	NP/PA	RN	Student	Total
Identify factors that place women at high risk (>20% over 10 years) for CVD event									
Pre	92.0	98.2	93.8	90.3	88.5	94.2	91.3	83.5	89.4
Post	96.4	94.5	100.0	96.8	96.6	94.9	96.1	91.7	94.3
n	251	109	32	31	87	137	541	303	1,851
p	<.001	.09	.15	.04	<.001	.71	<.001	<.001	<.001
Identify primary dietary source of trans fatty acids									
Pre	72.3	74.8	66.7	80.6	77.0	73.5	60.1	45.1	62.8
Post	85.1	92.8	86.7	93.5	89.7	90.9	84.5	66.0	82.1
N	242	111	30	31	87	132	537	297	1,823
p	<.001	<.001	<.001	.004	<.001	<.001	<.001	<.001	<.001
Identify correct information about use of statins in women to prevent CVD events									
Pre	50.8	51.8	22.6	64.5	35.2	40.3	20.3	17.1	28.9
Post	68.5	72.3	64.5	74.2	53.4	69.1	55.3	38.9	54.0
n	254	112	31	31	88	139	537	298	1,845
p	<.001	<.001	<.001	.22	<.001	<.001	<.001	<.001	<.001
Identify that postmenopausal hormone therapy and antioxidant vitamin supplements are not recommended for CVD prevention									
Pre	84.6	88.1	87.1	77.4	72.4	65.9	43.8	37.7	56.7
Post	96.1	96.3	96.8	87.1	86.2	97.1	92.8	67.1	87.1
n	254	109	31	31	87	138	544	292	1,839
p	<.001	<.001	.002	.11	<.001	<.001	<.001	<.001	<.001
Identify that African Americans, Latinas, and Asian Americans are at high risk for type 2 diabetes									
Pre	56.2	65.1	53.1	73.3	54.5	56.5	56.3	41.7	54.1
Post	75.1	84.9	90.6	86.7	86.4	84.1	85.9	62.3	79.4
n	249	106	32	30	88	138	547	300	1,844
p	<.001	<.001	<.001	.03	<.001	<.001	<.001	<.001	<.001
Identify that African Americans are most likely to die from heart disease among women of all races and ethnicities									
Pre	82.7	78.0	84.8	93.3	83.0	79.7	76.6	75.3	76.9
Post	90.4	96.3	100.0	96.7	87.5	95.7	94.3	88.7	91.2
n	249	109	33	30	88	138	542	300	1,844
p	<.001	<.001	.02	.3	.2	<.001	<.001	<.001	<.001
Identify facts related to smoking cessation in women									
Pre	62.7	75.7	59.4	61.3	69.0	55.5	46.9	44.9	52.3
Post	83.7	87.4	93.8	87.1	80.5	75.9	69.5	68.1	74.0
n	252	111	32	31	87	137	544	301	1,833
p	<.001	<.001	<.001	<.001	.007	<.001	<.001	<.001	<.001
Identify facts about treatment of hypertension in women									
Pre	70.3	70.6	64.5	67.7	64.4	57.2	58.7	50.3	58.5
Post	81.9	86.2	83.9	74.2	85.1	71.0	79.7	63.3	76.9
n	249	109	31	31	87	138	542	300	1,815
p	<.001	<.001	.003	.41	<.001	<.001	<.001	<.001	<.001

Abbreviations: CVD, cardiovascular disease; MD/DO, physician or osteopathic physician; NP/PA, nurse practitioner or physician assistant; OB/GYN, obstetrician/gynecologist; RN, registered nurse.

nurses, knowledge increased from 44% to 70%. Posttest knowledge scores were lowest (<70%) for nurses and students.

Overall, 63% of providers recognized at pretest that baked products were the primary dietary source of trans-fatty acids in the U.S. diet. There was substantial post-lecture improvement in the percentage of providers who correctly identified primary dietary sources of trans-fatty acids ($p < .001$ overall and for most groups). All post-educational knowledge scores of trans-fatty acid sources were greater than 80%, compared with pre-lecture scores ranging between 41% and 81% (the latter in cardiologists).

Information Credibility and Impact on Clinical Care

After the lecture, 93% of providers agreed or strongly agreed that the information presented was credible, and 78% felt that the information would change the way they practice. Ninety percent felt the lecture made them more knowledgeable about CVD in women, and 84% felt the information would help them to provide culturally competent care to ethnically diverse patient populations. A subgroup ($n = 1,489$) completed a pre- and post-assessment of their self-perceived preparedness to address CVD prevention in women (Figure 2) among whom more than 90%

felt prepared to assess CVD risk, counsel women about the use of HT, antioxidant vitamin supplements, and aspirin, and about their prevention, evaluation, and treatment of heart disease in women across different racial and ethnic groups after the intervention.

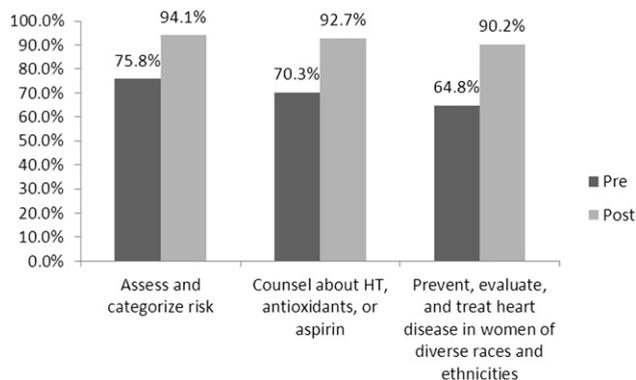


Figure 2. Provider self-perceived preparedness to address CVD prevention in women before and after the Heart Truth lecture. $p < .001$ for the difference between pretest and posttest within each pair.

Discussion

The Heart Truth Professional Education Campaign CME lecture was delivered across three states to diverse audiences of healthcare providers, including physicians, mid-level providers, nurses, and students. Baseline differences in provider knowledge regarding CVD in women were identified and primarily associated with the provider type and not attributable to heterogeneity across the regions or patient populations. Nearly 5 years after the 2004 pilot study, the knowledge scores of the different physician groups at baseline were nearly identical to those in the pilot study (Pregler et al. 2009). All participant groups showed improved knowledge after the lectures, and those groups with the lowest baseline scores generally improved the most. After the educational lectures, the differences in knowledge across occupational groups were greatly attenuated.

The lower baseline knowledge identified among the OB/GYNs as a group is consistent with the results of the initial pilot test of these materials (Pregler et al., 2009). The results also support the findings from a focus group study of OB/GYNs that found that knowledge and training deficits were one barrier to their ability to provide evidence-based CVD preventive care to women (Ehrenthal et al., 2011). The need to focus on this group of providers through the development of a standard *Heart Truth* Professional Education Campaign lecture specifically designed for OB/GYNs has been implemented as suggested by the authors (Bennett et al., 2012). Another notable difference in knowledge at baseline appeared among cardiologists, who were the most likely of the physician groups to recommend the use of HT and antioxidant vitamin supplements for the prevention of heart disease in women. Neither of these interventions is currently recommended, and greater attention to the new AHA guidelines by that group is needed to address this knowledge gap (Mosca et al., 2011).

Baseline knowledge was lower for nurses, also seen in the original pilot compared with the physician groups and the mid-level providers (Pregler et al. 2009). One area where nurses scored the lowest was knowledge relevant to the use of medications, which may be attributable to differences in their scope of practice compared with physicians. However, other relatively low scores not attributable to scope of practice were related to lifestyle recommendations, including dietary sources of trans-fatty acids and factors related to smoking cessation. Because counseling patients about healthy lifestyles and behaviors is an important role for primary care nurses, this deficit is important to recognize and address in future educational interventions.

The results identify gaps in baseline knowledge in several areas that might contribute to important disparities in clinical outcomes for women. The higher prevalence rate of diabetes for some racial and ethnic groups was not well known. Gender-specific knowledge around behavioral risk factor counseling was lacking in some groups, especially among nurses, who potentially play an important role in the prevention of heart disease in women. Knowledge scores of primary sources of trans-fatty acids and gender-specific issues important in smoking cessation and treatment for hypertension also were low. Finally, there was initial uncertainty about the use of statins and antioxidant vitamin supplements in women, as well as the role of postmenopausal HT.

The lectures modestly improved providers' knowledge of the role of statins in the prevention of CVD in women. Although this can partially be explained by poor baseline knowledge, the post-

lecture average score of 54% indicates that this is an area that needs additional focus. This could be accomplished by placing less emphasis on information better known at baseline, including women's risk factors for CVD, and placing greater emphasis on the use of statins to prevent CVD in women, as well as focusing on smoking cessation and treatment of hypertension in women.

One limitation of our assessment is that measuring test score change immediately following an educational lecture does not necessarily ensure long-term improvement in knowledge or change in clinical practice. The effectiveness of CME at changing provider performance has recently been called into question (Davis et al., 1999). A systematic review of the effects of different approaches to medical education has recently been completed by the Cochrane Collaboration and synthesized by others; traditional didactic lectures were found to be less effective than those supplemented by participant interactions (Marinopoulos et al., 2007; Satterlee, Eggers, & Grimes, 2008). The dissemination effort for *The Heart Truth* Professional Education Campaign completed in these three states also included several of these additional strategies, such as problem-based learning cases, standardized interviews, problem-based learning cases for medical students, and interactive training in brief motivational interventions. The use of these additional resources may have improved the overall learning and outcomes of the campaign beyond what was measured in these lectures.

The significant increase reported by the providers in their self-perceived preparedness suggests that the increase in knowledge may be associated with changes in practice. The strength of the evaluation lies in its inclusion of a wide variety of healthcare professionals across different states. This enabled an assessment of baseline knowledge and identification of gaps in knowledge within and between the different occupational groups. Awareness of these gaps can be used to guide modification of the lecture, future interventions, and future formal evaluations designed to assess long-term knowledge change and change in practice.

Most U.S. women receive clinical care from either a traditional primary care provider, such as a family practitioner, internist, or OB/GYN. Nurses also provide education and care to many women in both inpatient and outpatient settings; therefore, they are a key target group for educational interventions. The findings from this analysis suggest that the lectures improved knowledge about cardiovascular risk and prevention in these specialists, but knowledge gaps continued to exist after the lectures. Our results are consistent with the previous *Heart Truth* Professional Education Campaign pilot and indicate that tailoring lectures for physicians, related healthcare professionals, and others may be beneficial. More emphasis on all audiences on the use of statins and on facts about smoking cessation and treatment of hypertension in women also may be beneficial.

Conclusion

Heart disease is the leading cause of death among women in the United States, and improvement in screening and management of cardiovascular risk factors is needed to improve outcomes. The finding that knowledge improved across all provider specialties suggests that *The Heart Truth* Professional Education Campaign lectures can be effective at increasing knowledge across broad audiences (e.g., in groups of physicians,

nurses, mid-level healthcare professionals, and others). The discrepancy in baseline knowledge between physician specialists and others supports the value of tailoring the lectures to non-physician audiences' background. Additional adaptation for nurses may be needed based on their lower knowledge rates and the potential impact their counseling may have on patients. The results of student learning also suggest that alternative content and teaching methods merit consideration. Such adaptation was recently developed for OB/GYNs and the slide set is available online at www.womenshealth.gov/heart-truth. The intervention was implemented in three states with distinct demographic characteristics and the benefit of including these and other additional educational strategies, may require further evaluation.

References

- Bennett, S., Campbell, S., Chapin, J. (2012). New guidelines on the prevention of heart disease in women: The Heart Truth CME/CE [Internet]. Washington, DC: George Washington University Medical Center and U.S. Department of Health and Human Services, Office on Women's Health; 2011 [cited 2012 Mar 3]. Available from: <http://www.medscape.org/viewprogram/32051>.
- Canto, J. G., Rogers, W. J., Goldberg, R. J., Peterson, E. D., Wenger, N. K., Vaccarino, V., et al. (2012). Association of age and sex with myocardial infarction symptom presentation and in-hospital mortality. *JAMA*, 307, 813–822.
- Chou, A. F., Scholle, S. H., Weisman, C. S., Bierman, A. S., Correa-de-Araujo, R., & Mosca, L. (2007). Gender disparities in the quality of cardiovascular disease care in private managed care plans. *Women's Health Issues*, 17, 120–130.
- Chou, A. F., Wong, L., Weisman, C. S., Bierman, A. S., Correa-de-Araujo, R., & Scholle, S. H. (2007). Gender disparities in cardiovascular disease care among commercial and Medicare managed care plans. *Women's Health Issues*, 17, 139–149.
- Davis, D., O'Brien, M. A., Freemantle, N., Wolf, F. M., Mazmanian, P., & Taylor-Vaisey, A. (1999). Impact of formal continuing medical education: Do conferences, workshops, rounds, and other traditional continuing education activities change physician behavior or health care outcomes? *JAMA*, 282, 867–874.
- Ehrenthal, D. B., Nunez, A. E., O'Neill, E., Robertson-James, C., Addo, S. F., & Stewart, A. (2011). The role of the obstetrician/gynecologist in the prevention of cardiovascular disease in women. *Women's Health Issues*, 21, 338–344.
- Lloyd-Jones, D., Adams, R., Carnethon, M., Carnethon, M., Dai, S., De Simone, G., et al. (2009). Heart disease and stroke statistics—2009 update: A report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation*, 119, e21–181.
- Marinopoulos, S. S., Dorman, T., Ratanawongsa, N., Wilson, L. M., Ashar, B. H., Magaziner, J. L., et al. (2007). Effectiveness of continuing medical education. *Evidence Report/Technology Assessment*, 149, 1–69.
- Mosca, L., Appel, L. J., Benjamin, E. J., Berra, K., Chandra-Strobo, N., Fabunmi, R. P., et al. (2004). Evidence-based guidelines for cardiovascular disease prevention in women. *Circulation*, 109, 672–693.
- Mosca, L., Benjamin, E. J., Berra, K., Bezanson, J. L., Dolor, R. J., Lloyd-Jones, D. M., et al. (2011). Effectiveness-based guidelines for the prevention of cardiovascular disease in women—2011 update: A guideline from the American Heart Association. *Circulation*, 123, 1243–1262.
- Mosca, L., Grundy, S. M., Judelson, D., King, K., Limacher, M., Oparil, S., et al. (1999). Guide to preventive cardiology for women. AHA/ACC Scientific Statement: Consensus panel statement. *Circulation*, 99, 2480–2484.
- Mosca, L., Linfante, A. H., Benjamin, E. J., Berra, K., Hayes, S. N., Walsh, B. W., et al. (2005). National study of physician awareness and adherence to cardiovascular disease prevention guidelines. *Circulation*, 111, 499–510.
- Pregler, J., Freund, K. M., Kleinman, M., Phipps, M. G., Fife, R. S., Gams, B., et al. (2009). The Heart Truth professional education campaign on women and heart disease: Needs assessment and evaluation results. *Journal of Women's Health*, 18, 1541–1547.
- Satterlee, W. G., Eggers, R. G., & Grimes, D. A. (2008). Effective medical education: Insights from the Cochrane Library. *Obstetrical & Gynecological Survey*, 63, 329–333.
- Vaccarino, V., Parsons, L., Peterson, E. D., Rogers, W. J., Kiefe, C. I., & Canto, J. (2009). Sex differences in mortality after acute myocardial infarction: changes from 1994 to 2006. *Archives of Internal Medicine*, 169, 1767–1774.

Author Descriptions

Deborah B. Ehrenthal, MD, MPH, is an Associate Professor of Medicine and Obstetrics and Gynecology, Thomas Jefferson University, and Director of Health Services Research for Women and Children at CCHS. Her research interests include health and health care of reproductive age women.

Suzanne G. Haynes, PhD, is an epidemiologist and Senior Science Advisor, DHHS Office on Women's Health, where she manages programs to prevent heart disease in women including the Heart Truth Professional Education and the Make the Call. Don't Miss a Beat campaigns.

Kristen E. Martin, BA, is a research project manager with experience in chronic disease programs focusing on stroke and heart disease prevention. Ms. Martin designs programs, oversees data and evaluation, and disseminates results to facilitate program replication in appropriate settings.

Jeanne A. Hitch, MEd, MA, LPC, is a Project Manager, Frances Payne Bolton School of Nursing and an Adjunct Instructor, Department of Family Medicine, Case Western Reserve University. Her research interests include prevention of heart disease, heart failure, simulation, and education.

Sonya Feinberg Addo, MPH, is a public health worker and behavior change instructor. Her experience in clinical and administrative women's health programs includes work with Columbia University's OB/GYN Research Department, Planned Parenthood of NYC, and MEDCON's medical education and CME group.

Elizabeth O'Neill, BA, is the Project Director of the Community Center of Excellence in Women's Health at CCHS. Her experience in community outreach and coalition building is focused on addressing the health needs of underserved communities.

Ileana L. Piña, MD, MPH, FAHA, FACC, Associate Chief of Cardiology for Academic Affairs, Montefiore-Einstein Medical Center, is a heart failure/transplant cardiologist working to improve care and remove disparities of care for women and minorities relating to heart failure.

Ann M. Taubenheim, PhD, MSN, is a health communications and education specialist at the National, Heart, Lung, and Blood Institute, with extensive experience national-level health campaigns and communications outreach. She also is the director of The Heart Truth campaign.

Nancy L. Sloan, DrPH, is a perinatal and nutritional epidemiologist with extensive experience in Latin America, Asia, Africa and the U.S. in the development, monitoring and evaluation, investigation, and dissemination of maternal, neonatal, and child health, and nutritional interventions and programs.

Appendix. The Heart Truth Professional Education Campaign Knowledge Test

Please mark the best response to each question below.

- Which of the following conditions places a woman at high risk (>20% over 10 years) for a coronary artery disease event?
 - Established coronary artery disease
 - Cerebrovascular disease with carotid artery involvement
 - End stage renal disease
 - All of the above place a woman at high risk for a coronary artery disease event
 - Don't know
- Which of the following foods is the usual major dietary source of trans-fatty acids?
 - Processed meat
 - Baked products made with partially-hydrogenated vegetable oil
 - Fatty fish

- d. Whole milk
 - e. Don't know
3. Which of the following is true about the use of HMG CoA-reductase inhibitors (statins) in women?
- a. Women with diabetes should receive statin therapy to lower their level of low-density lipoprotein cholesterol (LDL-C) to <100 mg/dL
 - b. Statins are less effective in preventing coronary events in women than men
 - c. Women with coronary artery disease should receive lifestyle therapy first, with statin therapy initiated only if lifestyle therapy fails
 - d. All of the above are correct
 - e. Don't know
4. Which of the following is currently recommended to prevent coronary artery disease events in women?
- a. Post-menopausal hormone therapy with transdermal estrogen
 - b. Antioxidant vitamin supplements
 - c. Both transdermal estrogen and antioxidant vitamin supplements
 - d. None of the above is currently recommended to prevent coronary artery disease events in women
 - e. Don't know
5. Which of the following is true regarding the incidence of diabetes in women?
- a. Asian-Americans have a low risk of type 2 diabetes mellitus
 - b. African-Americans have a low risk of type 2 diabetes mellitus
 - c. Latinas have a low risk of type 2 diabetes mellitus
 - d. None of the above are correct
 - e. Don't know
6. Which of the following is true regarding race/ethnicity and heart disease and women?
- a. White women are more likely to die from heart disease than African American women
 - b. Among women of all races and ethnicities, African American women are the most likely to die from heart disease
 - c. Although heart disease is the leading cause of death for white women, it is not the leading cause of death for Asian-American women
 - d. Latinas are less likely to have risk factors for heart disease than white women
 - e. Don't know
7. Which of the following is true about counseling women about smoking cessation?
- a. Women respond to the same treatments as men
 - b. Depression is a more common barrier to smoking cessation in women compared to men
 - c. Concern about weight gain is a more common barrier to smoking cessation in women compared to men
 - d. All of the above are true statements
 - e. Don't know
8. Which of the following is true about the treatment of hypertension to prevent heart disease in women?
- a. Thiazide diuretics should be avoided in women with diabetes
 - b. Except for sodium restriction, diet changes are effective only if weight loss occurs
 - c. Increasing alcohol intake to two drinks per day is recommended, unless contraindicated
 - d. None of the above are true statements
 - e. Don't know