Journal of Cardiac and Pulmonary Rehabilitation

Yates et al., J Card Pulm Rehabil 2017, 1:1

Research Article OMICS International

Changes in Eating Behavior of Cardiac Rehabilitation Participants and Their Partners

Yates BC[1*], Brugh J[2], Kuchera A[1], Kupzyk K[1], Choquette B[3], Staskiewicz K[3], Krogstrand KS[4] and Hanson CK[5]

[1]*College of Nursing, University of Nebraska Medical Center (UNMC), Omaha, Nebraska, USA*

[2]*Nebraska Methodist Hospital, Omaha, Nebraska, USA*

[3]*Cardiopulmonary Rehabilitation, Nebraska Methodist Health System, Omaha, Nebraska, USA*

[4]*Department of Nutritional Sciences and Dietetics, University of Nebraska-Lincoln, USA*

[5]*College of Allied Health Professions, UNMC, Omaha, Nebraska, USA*

[*]**Corresponding author:** Yates BC, Professor, College of Nursing, University of Nebraska Medical Center (UNMC), Omaha, NE 68198-5330, USA, Tel: 402-559-5460; Fax: 402-559-81811; E-mail: bcyates@unmc.edu

Received date: April 25, 2017; **Accepted date:** May 17, 2017; **Published date:** May 22, 2017

Abstract

Purpose: The purpose of this study was to describe patterns of change over time (pre- and post-cardiac rehabilitation [CR] and 3 months later) in eating behavior (intake of total calories, total fat, saturated fat, monounsaturated and polyunsaturated fatty acids, trans-fats, omega-3 fatty acids, cholesterol, sodium, sugar, fiber, and alcohol) in CR patients and their partners.

Method: A repeated measures design was used to examine the real-life changes that occur in coronary artery bypass graft (CABG) surgery patients and partners in response to outpatient CR. This was a secondary analysis of data from a randomized clinical trial that tested the effects of the Partners Together in Health (PaTH) Intervention *versus* usual care in improving physical activity and healthy eating behaviors in CABG patients and their partners. Eating behavior was measured at baseline (entrance in CR), 3-months (post-CR), and 3 months later (6-months) in 34 patients and 34 partners using 3-day food records. Changes over time were examined using repeated measures analysis of variance (RMANOVA) tests. In addition, descriptive comparisons were made between eating behavior and guidelines from the American Heart Association (AHA).

Results: Surprisingly, few significant changes in eating behavior were found for either patients or partners. For patients and partners at each time point, percent of calories from fats was 31-33% (AHA=25-35%), percent from saturated fats was 10% (AHA<5-6% of total calories), trans-fat intake ranged from 2.5-3.0 g/day, and omega-3 intake ranged from 1.54-1.66 g/day. Percent of calories from mono- and polyunsaturated fats also remained stable over time with polyunsaturated fats being the lowest percent of fat that patients and partners were consuming. Sodium intake averaged >2800 mgs/day for patients and >2500 mgs/day for partners and was above the recommended daily level for both normotensive (2400 mg/day) and hypertensive individuals (1500 mg/day) at all 3 time points. Similarly, added sugar intake ranged from 44-52 g/day for patients and 41-55 g/day for partners and was greater than the recommended amount of 30 g/day. Intake of total fiber was <21 g/day for patients and <18 g/day for partners and was below the recommended amount (25-35 g/day) at all 3 time points. In partners, cholesterol intake increased significantly over time ($p<0.05$).

Conclusions: Patients and partners met dietary AHA guidelines in relation to percent of calories from fat; but did not meet guidelines in relation to intake of saturated fat, sodium, added sugar (too much) and fiber (too little). Standard CR educational methods may not be adequate to assist CABG patients and partners make the dietary changes needed after a cardiac event. Innovative care management models are needed to motivate patients and partners to take a more active role in improving their eating behavior both during and post-CR.

Introduction

The foremost risk factor for death and disability in the United States is suboptimal diet quality, which in 2010 led to 678,000 deaths due to all causes [1]. Major contributors were inadequate intakes of fruits, nuts and seeds, whole grains, vegetables, and seafood, as well as excessive intake of sodium. The American Heart Association estimates that 72.5% of U.S. adults over the age of 20 years earn a poor diet score for cardiovascular health based on the recommended dietary components [2]. In 2010 in the U.S., an estimated 58,000 CVD deaths due to cardiovascular disease (CVD) were attributable to sodium intake greater than 2000 mg/d, representing 1 in 16 (6.3%) of all CVD deaths and 1 in 8 (13.1%) CVD deaths before age 70 years [1].

Heart healthy dietary changes in patients with coronary heart disease (CHD) have been found to lower blood pressure and reduce the risk of secondary heart disease, myocardial infarction, and stroke [3-6]. However, in individuals with CHD, adherence to dietary recommendations is less than optimal [6-7]. The majority of patients followed a heart healthy diet during CR; however, less than half of participants were following the diet 1-3 years later [7]. Similar results were found by Chow et al. [8] in the OASIS (Organization to Assess

Strategies in Acute Ischemic Syndromes) trial. In the 668 coronary artery bypass graft (CABG) surgery patients in this trial, 21% of participants did not adhere to diet or exercise prescriptions, 43% adhered to one or the other (not specified by authors), and only 36% adhered to both diet and exercise at 3 months post event.

Nutritional counseling is one of the core components of Cardiac Rehabilitation (CR) [9]. Several investigators reported declines in dietary fat and cholesterol intake as a result of intensive nutritional education, counseling, and behavioral interventions [10-14], similar to the nutritional counseling provided in CR. In the Australian COACH trial, post-myocardial infarction patients who received a telephone intervention reported significantly less fat and saturated fat in their diets than the control group [15]. However, these studies reported dietary changes in response to fairly intensive interventions. It is less clear what real-life changes occur in response to the educational and counseling efforts of standard CR sessions. The purpose of this study was to describe the patterns of change over time (pre and post-CR and 3 months later) in eating behavior (total calories, total fat, saturated, monounsaturated and polyunsaturated fatty acids, trans-fats, omega-3 fatty acids, sodium, sugar, fiber, and alcohol) in CR patients and their partners.

Method

Design

This was a secondary analysis of data from a randomized clinical trial that tested the effects of the Partners Together in Health (PaTH) Intervention *versus* usual care in improving physical activity and healthy eating behaviors in CR participants and their partners [16]. In the intervention, partners in the PaTH Intervention group participated in exercise sessions and educational classes in cardiac rehabilitation with the patient and were asked to make the same physical activity and healthy eating changes as the patient. Partners in the usual care (UC) group were invited to attend the educational sessions with the patient. Data were collected at three time points: Baseline (close to the start of CR), 3 months (coincided with completion of CR), and 3 months later (labeled 6 months).

A convenience sample from a mid-western academic medical center and a community hospital was used. Eligible patients included: a) age 19 or older (age of majority in Nebraska); b) recent CABG surgery; c) enrollment in outpatient CR; and d) classified as low to moderate risk for the occurrence of cardiac events during exercise [17]. Exclusion criteria were: a) orthopedic problems that limited physical activity; b) severe chronic obstructive lung disease, poorly controlled diabetics, or unstable heart failure; and c) history of severe psychiatric disease. The sample size for this study (n=34 patients and n=34 partners) was determined by logistical and budgetary constraints as the study was considered a feasibility trial with results being used to guide further research.

Cardiac rehabilitation program

Patients in both CR programs received similar CR elements in that they were provided with individualized counseling, education, goal setting in relation to life style changes (i.e., exercise regularly, eat low fat diet, lose weight, etc.,) and feedback about progress towards goals at regular intervals. Both CR programs were nationally certified by the AACVPR indicating standardized program elements. Individualized counseling and education were provided by a multidisciplinary team of nurses, dietitians, pharmacists, exercise specialists, and physicians. Individualized exercise plans were implemented that included aerobic, strength, and flexibility exercises, 3 days a week for 6 to 12 weeks (18 to 36 sessions). Group education classes in nutrition, exercise, smoking cessation, knowledge of heart disease and risk factors, stress management, medications, and lifestyle change were offered on a regular cycle. The vast majority of the dietary information and counseling was provided by dietitians in these CR programs. The following dietary classes were provided: "Healthy Diet: The Basics", "How to Defat your Diet", "Reading Labels", "Nutrition: Spice up Your Life", and "Eating Out". The specific diet goals that were negotiated with CR participants were: 25-35% of total calories as fat; <5-6% as saturated fats; <200 mg/d of cholesterol; and 20-25 g/day of total fiber, and <2400 mg/day of sodium if normal blood pressure or <1500 mg/d if hypertensive [18]. In addition to these specific dietary goals, participants received information on the overall AHA guidelines (e.g., increasing "good" fat and reducing "bad" fat, eating more fruits/vegetables, lean meat, nuts, legumes, cutting down on sugar, etc.).

Measures

A 3-day Food Record was used to assess food intake and changes in eating behavior over time [19]. This technique is a well-accepted measure of dietary intake [20-21]. The participant recorded all food and beverages consumed on 3 typical days including two weekdays and one weekend day. The participants were asked to describe in as much detail as possible their food intake, recording ingredients, name brands, and portion sizes. Portion sizes were estimated based on standard household measures and the use of a packet of food pictures depicting portion sizes was provided to each participant. They were also instructed to list all of the dietary supplements that took on a regular basis (i.e., multivitamin, fish oil, garlic, CoQ-10, etc.). The participants were instructed in the method of completing the 3-day Food Record by a member of the research team. Dietary intake data were then analyzed using Nutrition Data System for Research software. This software provides a complete nutrient profile for all foods in the database. The NDS-R has a comprehensive quality control system to ensure accuracy and internal consistency of the database [22]. Using this software, the following variables were generated for analysis based on an average of the 3-day food intake: 1) calories/day, 2) sodium (mg/day), 3) alcohol (g/day), 4) % of calories from fat, saturated fat, monounsaturated fat, and polyunsaturated fat, 5) trans-fat (g/day), 6) omega-3 fatty acids (g/day), 7) cholesterol (mg/day), 8) fiber (g/day), and 9) added sugars.

Data Analysis

Repeated measures analysis of variance (RMANOVA) was used to examine changes over time in dietary nutrients. Although the initial study design was two treatment groups, because there were no statistically significant differences in changes over time between groups, all patients were combined into one group for this analysis as were partners. Separate RMANOVAs were examined for patients and for partners. The level of significance for examining changes over time was set at $p<0.05$ (two-tailed tests). Post-hoc pairwise comparisons were tested using Tukey's HSD test. In addition, because this was a feasibility study, we were interested in calculating effect sizes (ES) from the data. The following values were used for interpreting effect sizes (eta-squared η^2) using RMANOVA: small=0.01; medium=0.06; large=0.14.

Results

Patients were, on average, 61.7 ± 10.3 years of age; partners were 59.5 ± 11.6 (see Table 1). The majority of the couples were married, Caucasian, employed, had two years of college education, and an annual household income between $30–70,000. In relation to CR, patients in both groups demonstrated very good adherence to both exercise (94.4%) and educational (81.6%) sessions. Partners in the PaTH group also demonstrated high adherence to the exercise sessions (89.4%). Across all partners, adherence to the educational sessions was lower for partners (73.6%) than for patients.

The dietary nutrient results at each of the three times points are in Table 2 (patients) and Table 3 (partners). Dietary recommendations for a heart healthy diet, based on AHA guidelines [18], were included in the table for comparison purposes. Few significant changes or medium to large effect sizes were found over time in patients or partners. In patients, alcohol intake increased significantly over time to less than 1 drink per day at 6 months.

	Patients M ± SD (range)	**Partners M ± SD (range)**
Age (years)	61.7 ± 10.3 (33-77)	59.5 ± 11.6 (29-76)
Education (years)	14.6 ± 2.4 (9-17)	14.1 ± 2.3 (8-17)
Cardiac rehab (% adherence)		
Exercise sessions Educational sessions	94.4 ± 14.2 (33-100) 81.6 ± 3.7 (39-100)	89.4 ± 15.1 (50-100)* 73.6 ± 32.9 (0-100)
No. of bypass grafts	3.5 ± 1.1 (1-5)	--
Ejection fraction	55.9 ± 6.9 (37.5-67.5)	--
	N (%)	N (%)
Gender		
Male Female	28 (82%) 6 (18%)	5 (15%) 29 (85%)
Married	32 (94%)	--
Employment		
Working Retired/not working	24 (71%) 10 (29%)	20 (59%) 14 (41%)
Household Income		
<$30,000 annually $30-70,000 annually >$70,000 annually	3 (9%) 18 (53%) 13 (38%)	--
*% adherence to exercise sessions only calculated in partners in PaTH experimental group		

Table 1: Demographic and Illness Characteristics of Patients and Partners at Baseline.

The significant increase occurred between baseline and 6 months (p=01). In partners, an increase in total calories was borderline significant (p=0.055) and cholesterol intake increased significantly over time. The significant increase occurred between post-CR and 6 months (p=036).

At each time point, patients were consuming approximately 31% of calories from fat and partners were consuming about 33% which falls within the daily recommended allowance of 25-35%. Percent of calories from saturated fats was also similar for patients and partners and was about 10% at each time point, higher than the recommended amount of <5-6% of total calories. Percent of calories from mono- and polyunsaturated fats also remained stable over time with polyunsaturated fats being the lowest percent of fat that patients and partners were consuming. For patients and partners, trans-fat intake ranged from 2.5-3 g/day and omega-3 intake ranged from 1.54-1.66 g/day. Sodium intake averaged >2800 mgs/day for patients and slightly less for partners (2590-2795 mgs/day) and was above the recommended daily level for both normotensive (2400 mg/day) and hypertensive individuals (1500 mg/day) at all 3 time points. Sodium intake was compared between normo- and hypertensive individuals and no differences were found between patients or partners. Over time, intake of added sugar was above the recommended amount of 30 g/day and intake of total fiber was below the recommended amount (25-35 g/day) for patients and partners.

	AHA guidelines	**Baseline**	**3 months**	**6 months**	**Effect size η2**

		Mean ± SD	Mean ± SD	Mean ± SD	
Total calories	Varies based on body weight	1649.6 ± 439.7	1695.3 ± 471.4	1762.3 ± 484.5	0.030
Sodium (mg)[a]	1500 mg or 2400 mg	2810.7 ± 831.8	2901.8 ± 1281.2	2893.8 ± 1040.9	0.004
Alcohol (grams)	14 grams=1 drink	2.27 ± 4.4	5.97 ± 6.8	8.09 ± 11.1	0.149b
% of calories from fat	25-35%	31.5 ± 7.0	31.1 ± 6.9	31.1 ± 6.8	0.003
% of calories from saturated fat	<5-6%	10.5 ± 3.5	10.1 ± 3.2	10.2 ± 2.7	0.007
% of calories from monounsaturated fat	--	11.8 ±2.9	11.4 ± 2.9	11.4 ± 3.0	0.012
% of calories from polyunsaturated fat	--	6.5 ± 2.5	7.0 ± 2.4	6.7 ± 2.0	0.015
Trans-fats (grams)[c]	--	3.0 ± 2.1	2.8 ± 1.6	2.5 ± 2.1	0.027
Omega 3 fatty acids[c] (grams)	--	1.58 ± 1.0	1.57 ± 0.8	1.66 ± 0.7	0.004
Cholesterol (mg)	<200 mg	213.0 ± 99.7	207.4 ± 119.7	229.7 ± 85.1	0.024
Total fiber (grams)	25-35 grams	18.6 ± 7.1	20.9 ± 7.1	20.8 ± 7.9	0.051
Added sugars[d]	30 gm	48.7 ± 24.1	44.7 ± 22.2	51.9 ± 30.7	0.040

RMANOVA=Repeated measures analysis of variance
AHA=American Heart Association guidelines [18]
CABG=Coronary artery bypass graft surgery
[a]1500 mg sodium if diagnosed with hypertension; 2400 mg if normotensive [18]
[b]F (df=2)=5.44, p=0.007
[c]The AHA recommends a diet low in trans-fat and high in omega-3 fatty acids but no recommended daily amounts have been established.
[d]Amount of added sugar based on 2000 calorie diet [13]

Table 2: RMANOVA Testing Changes over time in Dietary Components (n=34 CABG patients).

	AHA guidelines	Baseline Mean ± SD	3 months Mean ± SD	6 months Mean ± SD	Effect size η^2
Total calories	Varies based on body weight	1543.8 ± 386.0	1576.2 ± 345.5	1712.5 ± 450.7	0.089a
Sodium[b]	1500 mg or 2400 mg	2589.7 ± 808.1	2693.1 ± 642.3	2795.1 ± 805.7	0.025
Alcohol (grams)	14grams=1drink	5.4 ± 8.0	7.1 ± 10.3	7.1 ± 10.6	0.049
% of calories from fat	25-35%	32.9 ± 8.3	33.2 ± 8.2	34.0 ± 6.5	0.007
% of calories from saturated fat	<5-6%	10.4 ± 2.8	10.8 ± 3.7	10.9 ± 2.6	0.011
% of calories from monosaturated fat	--	12.4 ± 3.5	12.2 ± 3.5	12.4 ± 2.8	0.006
% of calories from polyunsaturated fat	--	7.3 ± 3.0	7.3 ± 2.4	7.8 ± 2.1	0.019
Trans-fats (grams)[c]	--	2.8 ± 2.2	3.1 ± 1.6	2.8 ± 1.9	0.013
Omega 3 fatty acids[c] (grams)	--	1.64 ± 1.1	1.48 ± 0.6	1.59 ± 0.6	0.013
Cholesterol (mg)	<200 mg	209.0 ± 110.7	184.4 ± 84.3	254.6 ± 137.7	0.134[c]
Total fiber (grams)	25-35 grams	16.1 ± 5.2	16.8 ± 6.1	17.1 ± 5.3	0.021
Added sugars[e]	30 grams	46.5 ± 36.7	41.1 ± 24.2	55.2 ± 46.2	0.051

RMANOVA=Repeated measures analysis of variance; AHA=American Heart Association guidelines [18]
[a]F (df=2)=3.032, p=0.055
[b]1500 mg sodium if diagnosed with hypertension; 2400 mg if normotensive [18]

[c]The AHA recommends a diet low in trans-fat and high in omega-3 fatty acids but no recommended daily amounts have been established
[d]F (df=1.878)=4.779, p=0.013
[e]Amount of added sugar based on 2000 calorie diet [13]

Table 3: RMANOVA Testing Changes over time in Dietary Components (n=34 partners).

Discussion

The findings of this study suggest that few changes occurred in eating behavior in response to participation in cardiac rehabilitation. Not only did the patients and partners make few changes, they also did not meet AHA recommendations for a heart healthy diet, particularly for excess saturated fat, sodium, and added sugar and limited fiber intake. During CR, patients and partners had participated in multiple classes on: dietary basics, fats and oils, label reading, and eating out. The partner was often female (70% in this study) and in most households was the family cook and was diligent about trying to change family eating patterns. Based on qualitative data from this same sample, these patients and partners indicated that making dietary changes was the most difficult lifestyle change for them to make (<1% were smokers). They also identified that they wanted more specific information about how to implement the diet in their everyday lives with such things as menus, lists of healthy snacks, cookbook recommendations, web-based resources for diet information, and food substitutes (such as bananas for oil in muffins).

Similar to the findings in this study, Scotto et al. [23] found that CR participants had stable scores on the Diet Habit Survey between CR completion and two months later (scores decreased from 225 to 218, p=0.085). Borowicz-Bienkowska et al. [24], in a quasi-experimental study, found that patients after a percutaneous coronary intervention who participated in short-term CR had reduced intake of calories, cholesterol, and saturated fatty acids. The dietary counseling consisted of 2-3 one-on-one sessions with a physician with expertise in dietary guidelines, 2-3 weekly meetings with a dietitian, and an informational brochure. Even with this intensive intervention and the significant reduction in energy intake of saturated fat (13.6% at baseline to 10.2% at one year) [24], it was still higher than the recommended amount of saturated fat (<5-6% of total calories). In another study, findings from the Behavioral Risk Factor Surveillance data indicated that individuals post-heart attack who attended CR were 1.5 times more likely to meet the dietary recommendation of five fruits and vegetables per day than those who did not participate in CR [25]. However, the prevalence of individuals in CR who met recommendations for fruit and vegetable intake was still only 29.5% [25].

One of the reasons given by CR participants as to why they do not always select healthier choices is the cost. Mozzafarrian et al. [1] reported that the more healthful dietary patterns cost on average about $1.50 per day more than unhealthful diets. This would increase the annual grocery budget about $550 which, when weighed against the "cost" of future cardiac events and potential disability, seems like a small price to pay. Healthy *versus* unhealthy snack options have also been compared: the cost of 20 fruits and vegetables *versus* 20 common snack foods such as cookies, chips, pastries, and crackers, the average price per portion of fruits and vegetables was 31 cents, with an average of 57 calories per portion, *versus* 33 cents and 183 calories per portion for snack foods [1].

It is difficult for individuals to know exactly how much fat, sodium, fiber, etc. they are consuming without keeping track of their dietary intake for a few days. To be successful in changing behaviors, individuals typically need to set clear goals and changes need to be tracked through self-monitoring [26]. Self-monitoring allows individuals to become aware of their eating behaviors, the amount of food consumed, situations that create barriers to positive behavior changes and provides an effective means to promote healthy eating [27]. Patients were instructed in their diet classes to limit total fat, saturated fat, and sodium intake yet without individualized counseling about their own unique eating patterns, it is very difficult for a participant to figure out the changes they need to make on their own. In addition to the individualized counseling that is needed, there are several free online programs for monitoring daily food intake (e.g., MyFitnessPal) that could assist individuals in the dietary modifications that are needed to meet guidelines. Self-monitoring is something patients could easily be taught to do as part of their educational classes within the CR program. Innovative care management models, such as the one described in Ciccone et al. [28], are needed to motivate patients and partners to take a more active role in improving their eating behavior both during and after cardiac rehabilitation. In this study, health care providers formed a collaborative interdisciplinary team, that included the patient, for ongoing disease management at home. Results showed that the program was highly effective in increasing patient health knowledge, self-management skills, and readiness and confidence to continue to make changes in health behaviors [28]. CR participants need to be exposed to multiple educational strategies using group and individual sessions to assist them in making healthy eating choices.

It was surprising that there were so few changes in patients' and partners' eating behaviors over time. It may be because many dietary changes had already occurred prior to the CABG surgery. Eating behavior was measured at the start of the CR program, when patients and partners may have already received information about the need to make diet changes as inpatients, and perhaps they were quick to adopt healthier eating behaviors within the few days between hospital discharge and the start of CR. This is also when they were enrolled in the study and completed their baseline 3-day food records; thus, the lack of a true baseline may have hindered our ability to detect changes in response to outpatient CR. Other limitations of the study included the relatively small sample size, the predominantly Caucasian sample, using a convenience sample, and self-report of eating behavior. We know individuals tend to underestimate dietary intake; yet most current methods of measuring eating behavior are *via* self-report. Better methods of measuring dietary intake are needed that are reliable and valid. Another limitation of the study was that we did not examine the effect of the dietary supplements on the cardiovascular health of these participants and what effect these had on the nutritional and dyslipidemia outcomes over time [29]. This would also be an important area for future research.

In summary, few significant changes in eating behavior were found for either patients or partners in response to standard outpatient CR. Patients and partners did not meet AHA guidelines in relation to intake of saturated fat, sodium, added sugar (too much) and fiber (too

little). Participants met dietary guidelines in relation to percent of calories from fat. Standard CR educational methods may not be adequate to assist patients and partners make the dietary changes needed after a cardiac event.

References

1. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, et al. (2016) Heart disease and stroke statistics—2016 update: A report from the American Heart Association. Circulation 133: 38-360.
2. Go AS, Mozaffarian D, Roger VL, Benjamin EJ, Berry JD, et al. (2014) Heart disease and stroke statistics-2014 update. Circulation 129.
3. Fung TT, Rexrode KM, Mantzoros CS, Manson JE, Willett WC, et al. (2009) Mediterranean diet and incidence of and mortality from coronary heart disease and stroke in women. Circulation 119: 1093-1100.
4. Lichtenstein AH, Appel LJ, Brands M, Carnethon M, Daniel S, et al. (2006) Diet and lifestyle recommendations revision 2006: A scientific statement from the American Heart Association nutrition committee. Circulation 114: 82-96.
5. Mente A, de Koning L, Shannon HS, Anand SS (2009) A systematic review of the evidence supporting a causal link between dietary factors and coronary heart disease. Arch Intern Med. 169: 659-669.
6. Smith SC Jr, Benjamin EJ, Bonow RO, Braun LT, Creager MA, et al. (2011) AHA/ACCF secondary prevention and risk reduction therapy for patients with coronary and other atherosclerotic vascular disease: 2011 update: A guideline from the American Heart Association and American College of Cardiology Foundation. Circulation 124: 2458-2473.
7. Twardella D, Merx H, Hahmann H, Wüsten B, Rothenbacher D, et al. (2006) Long term adherence to dietary recommendations after inpatient rehabilitation: Prospective follow up study of patients with coronary heart disease. Heart 92: 635-640.
8. Chow CK, Jolly S, Rao-Melacini P, Fox KA, Anand SS, et al. (2010) Association of diet, exercise, and smoking modification with risk of early cardiovascular events after acute coronary syndromes. Circulation 121: 750-758.
9. Hamm LF, Sanderson BK, Ades PA, Berra K, Kaminsky LA, et al. (2011) Core competencies for cardiac rehabilitation/secondary prevention professionals: 2010 update. J Cardiopul Rehabil Prev 31: 2-10.
10. Blokstra A, van Dis I, Verschuren WM (2012) Efficacy of multifactorial lifestyle interventions in patients with established cardiovascular diseases and high risk groups. Eur J Cardiovasc Nurs 11: 97-104.
11. Hooper L, Summerbell CD, Thompson R, Sills D, Roberts FG, et al. (2016) Reduced or modified dietary fat for preventing cardiovascular disease. Sao Paulo Med J 134: 182-183.
12. Artinian NT, Fletcher GF, Mozaffarian D, Kris-Etherton P, Van Horn L, et al. (2010) Interventions to promote physical activity and dietary lifestyle changes for cardiovascular risk factor reduction in adults: a scientific statement from the American Heart Association. Circulation 122: 406-441.
13. Christie C, Worel JN, Hayman LL (2016) Implementation of the 2015 dietary guidelines: Who, what, why where, and when. J Cardiovasc Nurs 31: 5-8.
14. Ivens BJ, MS Edge (2016) Translating the dietary guidelines to promote behavior change: Perspectives from the Food and Nutrition Science Solutions Joint Task Force. J Academy Nutri Diet, 116: 1697-1702.
15. Vale MJ, Jelinek MV, Best JD, Dart AM, Grigg LE, et al. (2003) Coaching patients on Achieving Cardiovascular Health (COACH): A multicenter randomized trial in patients with coronary heart disease. Arch Intern Med 163: 2775-2783.
16. Yates BC, Norman J, Meza J, Stanek Krogstrand K, Harrington S, et al. (2015) Effects of Partners Together in Health Intervention on physical activity and healthy eating behaviors: A pilot study. J Cardiovasc Nurs 30: 109-120.
17. American Association of Cardiovascular and Pulmonary Rehabilitation (2013) Guidelines for cardiac rehabilitation and secondary prevention programs (5th ed), Human Kinetics, Champaign IL.
18. Eckel RH, Jakicic JM, Ard JD, de Jesus JM, Houston Miller N, et al. (2013) AHA/ACC guideline on lifestyle management to reduce cardiovascular risk: A report of the American College of Cardiology/American Heart Association task force on practice guidelines. Circulation.
19. Lee RD, DC Nieman (2003) Nutritional assessment (3rd ed), McGraw-Hill, New York.
20. Fabricatore AN, Wadden TA, Ebbeling CD, Thomas JG, Stallings VA, et al. (2011) Targeting dietary fat or glycemic load in the treatment of obesity and type 2 diabetes: A randomized controlled trial. Diabetes Res Clin Pract 92: 37-45.
21. Kubena KS (2000) Accuracy in dietary assessment: On the road to good science. J Am Diet Assoc 100: 775-776.
22. Schakel SF, Sievert YA, Buzzard IM (1988) Sources of data for developing and maintaining a nutrient database. J Am Diet Assoc 88(10): 1268-1271.
23. Scotto CJ, Waechter DJ, Rosneck J (2011) Adherence to prescribed exercise and diet regimens two months post-cardiac rehabilitation. Can J Cardiovasc Nurs 21: 11-17.
24. Borowicz-Bienkowska S, Deskur-Smielecka E, Maleszka M, Przywarska I, Wilk M, et al. (2013) The impact of short-term cardiac rehabilitation on changing dietary habits in patients after acute coronary syndrome. J Cardiopul Rehabil Prev 33: 234-238.
25. Wofford T, Greenlund K, Croft J, Labarthe D (2007) Diet and physical activity of U.S. adults with heart disease following preventive advice. Prev Med 45: 295-301.
26. Burke LE, Wang J, Sevick MA (2011) Self-monitoring in weight loss: A systematic review of the literature. J Amer Diet Assoc 111: 92-102.
27. Michie S, Abraham C, Whittington C, McAteer J, Gupta S (2009) Effective techniques in healthy eating and physical activity interventions: A meta-regression. Health Psychol 28: 690-701.
28. Ciccone MM, Aquilino A, Cortese F, Scicchitano P, Sassara M, et al. (2010). Feasibility and effectiveness of a disease and care management model in the primary health care system for patients with heart failure and diabetes (Project Leonardo). Vasc Health Risk Manag 6: 297-305.
29. Scicchitano P, Cameli M, Maiello M, Modesti PA, Muiesan ML, et al. (2014). Nutraceuticals and dyslipidaemia: Beyond the common therapeutics. J Funct Foods 6: 11-32.