Knowledge of Cardiovascular Medications in a Culturally Diverse Elderly Community: Health Assessment Outcomes by Nursing Students

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Abstract

Lack of knowledge in medication use appears a major hindrance in managing cardiovascular diseases. The cross-sectional study examined the determinants of knowledge of cardiovascular medications in elderly community, using the survey questionnaire and structured interviews to collect data from 99 culturally-diverse elderly people at independent-living facilities in California. Results indicate that the majority of participants was women (82.8%), living alone with an educational level of high-school or higher. Sixty-six participants took at least one cardiovascular medication, and the average number of cardiovascular medications taken was 2.02 (±1.10). The most frequently used cardiovascular medications were lipid-lowering agents and aspirin. Thirtyeight participants demonstrated a lack of knowledge of cardiovascular medication use. After adjusting for age, gender, education, and living status, it was found that having a BMI higher than 25 (OR: 5.46; 95% CI; 1.12, 26.52), drinking alcohol beverages (OR: 0.075; 95% CI: 0.01, 0.83), and having a history of ever-smoking (OR: 54.90; 95% CI: 4.39, 686.29) were statistically significant, independent predictors of a lack of knowledge about cardiovascular medications.

Key Words: Medication, knowledge, elderly, cardiovascular diseases, independent living facility, nursing students.

1. Introduction

Current evidence shows that the cardiovascular disease (CVD) is the leading cause of morbidity and mortality among the elderly population. It was estimated that one in every six deaths occurred from coronary heart disease in 2012 [1]. Cardiac disease was estimated to result in >17.3 million deaths annually worldwide [2]. Absolute and relative risk assessments demonstrated that a considerable proportion of CVD events could be attributed to poor adherence to vascular medications [3]. Approximately, 50% of patients with the cardiovascular disease and its major risk factors showed poor adherence to their prescribed medications [4; 5]. And, an appropriate adherence to vascular medications could reverse the subsequent adverse outcomes. This study explored the knowledge of cardiovascular medication use in a culturally diverse elderly community utilizing health assessment data collected by nursing students in the state funded California University.

2. Literature review

Literature indicates that medications are an essential part of the treatment regimen for patients with cardiovascular diseases (CVD). However a substantial proportion of people did not adhere adequately to cardiovascular medications; and the prevalence of suboptimal adherence was similar across all individual CVD medications [3]. The benefits of medication therapy were well documented for secondary prevention in patients who had CVD [6; 7; 8]. Furthermore Hope, Wu, Tu, Young, and Murray [9] claimed that the patients' lack of medication knowledge and non-adherence to the CV medication was associated with frequent visits to emergency department and re-hospitalization.

Poor understanding of the medications is one possible reason for having lack of medication adherence in elderly people. Wolfe and Schirm [10] asserted that the elderly were more likely to suffer poor understanding of their medications because they might be taking various medications for multiple comorbidities. And they might be experiencing age-related degradations such as decreased memory and impaired vision and hearing. Molloy and colleagues who evaluated the reasons for hospitalization found that poor recall and lack of knowledge of the medication regimen among the elderly resulted in medication noncompliance [11]; and that medication noncompliance was directly associated with hospitalization [10]. In a cross sectional research, Rajpura and Nayak [12] also reported that the elderly suffering from hypertension with the greater level of perceived illness burden had the lower level of medication adherence.

Lack of knowledge about the medications could increase drug adverse effects, complications, substantial drug interactions and eventually poor health outcomes [9]. Recognizing the name of the medications and understanding why the medication should be taken would be helpful in self-care, communication with health care providers and tracking their own health information.

In particular, increasing numbers of authors were interested in knowledge of CV medicatons as well as cultural and behavioral health determinants of CV medications. Wu, Moser, Chung, and Lennie [13] argued that ethnic minorities were less likely to adhere to the medications among patients with CVD. And, limited English language proficiency presented a significant challenge for substantial numbers of minority elderly in the community [14]. Difficulty in maintaining proper medication use was observed more in Latino [15] and Chinese communities [16]. Finding innovative strategies to help patients improve their adherence to existing evidence-based cardiovascular drug therapies would be enormous potential for improving health outcomes while potentially reducing health care costs [4].

This study utilized the partial data obtained by the first year nursing students who participated in the community-based eldercare project with their clinical instructors at one of the state funded California universities. The community-based eldercare project was developed by nursing faculty and implemented to the nursing curriculum in 2003 as a mandatory project for all first year nursing students enrolled in fundamentals of nursing courses. By participating in the project, students could demonstrate knowledge, skills and attitudes related to the fundamentals of nursing; as the goal of this project was for students to apply the nursing process cycles and teaching-learning principles in their practice, and improve their therapeutic communication skills. The student roles were to visit their clients with the assigned faculty and assess the client's health conditions, develop health education projects based on assessment data, provide health education to the clients, and evaluate outcomes.

The project involved four senior housings that accommodated low income elderly residents.

This project was especially valuable for understanding the culturally diverse, elderly population in the Bay Area as no research had been conducted on the groups. The Bay Area is one of the most culturally diverse communities in the United States. Alameda County, where the university is located, is the most ethnically diverse county with the smallest percentage of Caucasians (33.2 %) and the largest percentage of African

Americans (12.4 %) in the Bay Area, as well as comparably large percentage of Asian Americans (28.2%) and Hispanic (22.7%) populations [17]. In addition to the cultural diversity, the Bay Area has the highest median age of any region of California; and over one twelveth (12.3%) of the Bay Area residents are 65 years or older [18]. Among the first year nursing students at the state funded California university 50-55% could speak another language fluently, such as Chinese, Hindi, Korean, Russian, Spanish, Tagalog, etc. This is extremely helpful for understanding the health care management of this culturally diverse, elderly population. The nursing students and elderly participants have been very appreciative with outcomes of the project. Therefore, the study aimed to describe the knowledge of medication use in culturally diverse, elderly communities and examine the determinants of knowledge of cardiovascular medications in elderly living at independent living facilities in the Bay Area.

3. Design and Methods

This study used a cross sectional, descriptive design with a convenience sample of culturally diverse elderly clients (n = 99) residing at four independent living facilities in the San Francisco Bay Area from October 2008 to November 2010. Data were collected by nursing students who were supervised by their faculty. Prior to data collection, students received a four-hour orientation about the study project, how to present the study questionnaire and conduct interview skills before they met the elderly. Before the nursing students began the project, they also took courses in therapeutic communication and principles of nursing practice in community. Nursing students in the first year of their baccalaureate nursing program understood well on how to interview and assess the relatively healthy elderly clients in the community. The students were also aware of that the data collected would be used for education and research purposes.

Both nursing faculty and students recruited the study participants from four independent senior apartments in the Bay Area. The inclusion criteria included those aged 65 years old or older and those living in independent living facilities. The study participants included both non-English and English speakers as translators were available. When a subject preferred to speak in another language and a student able to speak the same language fluently was present at the time of data collection, the student translated the questionnaire into the language and translated the subject's answers back to English in the questionnaire. The study was approved by the institutional review board of the human subjects (IRB-HS) at the university and facilities. Flyers and posters were used to announce the nursing students' visits at each site, and potential participants were asked to visit the designated places in the apartment. On the visiting day, the faculty and students welcomed the potential study participants in the designated place, introduced themselves and explained about the project and research opportunity. After obtaining informed consents, students conducted an interview using the structured questionnaire and collected the data under the supervision of their faculty. Each data collection process took approximately 25-30 minutes.

3.1 Measurements

The study questionnaire was developed and content analyzed by this author and faculty experts in the community health and geriatrics [19]. Four faculty teaching fundamentals of nursing courses reviewed the questionnaire which was then revised according to their recommendations. Evaluation of the questionnaire by the nursing faculty helped to establish content validity. The pilot study was performed to residents in one of the facilities to establish reliability when the questionnaire was first developed and implemented in 2003.

The data were collected using a questionnaire that included vital signs and blood glucose assessed by nursing students at the time of interview. The additional information nursing students obtained from the survey

included weight and height to calculate the body mass index (BMI), demographics, medical history, including health/nutrition histories and medication use, health behaviors, and cultural background. Data collected regarding medication use included the name and the indication of medication use. Cultural background data included ethnicity, how many years they had lived in the U.S., and the language they preferred to speak with health care providers.

3.1.1. Medical Histories.

The researchers evaluated the medical histories by asking if the study subjects had ever been hospitalized or undergone surgery, and to specify the reasons for these events. For medical diagnoses, the researchers listed the following ten medical diagnoses which had previously been reported as the most common medical diagnoses among this population [20]: Myocardial infarction, congestive heart failure, peripheral vascular disease, angina, hypertension, lipid abnormality, arthritis, diabetes, depression, and kidney insufficiency. The study subjects were asked if they had been diagnosed with any of the ten conditions. They were also asked to specify other medical diagnoses.

3.1.2. Health Behaviors.

To assess physical activity, the participants were asked, "During the past month, other than your regular job, did you participate in any physical activities or exercises, such as running, bicycling, calisthenics, golf, gardening, or walking for exercise?" This question has been used by the behavioral risk factor surveillance system (BRFSS) [21]. If participants answered "yes", they were asked if the exercise was moderately intense physical activity for at least 30 minutes and how often they exercised in this way.

Current drinking behavior and alcohol dependence were measured to evaluate alcohol use. The participants were asked if they drank alcohol. If they indicated so, they were also asked using the four-question CAGE instrument [22]. The total score ranges from 0 to 4 and a cutoff point of 2 or above indicates alcoholism. CAGE was easy to administer and reported to demonstrate good sensitivity and specificity for alcohol abuse or dependence (74% to 89% and 79% to 95%, respectively) for both inpatients and outpatients [22]. The participants were also asked if they smoked ever, were a current smoker, how many packs per day they smoked and if they wanted to quit smoking.

3.1.3. Knowledge of cardiovascular (CV) medications.

The participants were asked the name and reasons for taking their medications with an open ended question, "Tell me about the medications you are taking. Do you know the name of the medications and the reasons for taking the medications?" If the participants indicated that they knew the name of the medication, the students asked the participants to state the name. The students used a table to list the names of the medications and the reasons for taking the medications if the participants took multiple medications.

The researchers determined the CV-medication takers if the participants indicated that they were taking any CV medications, irrespective of whether they were aware of the name of the CV medications. The participants were considered knowledgeable; (a) if they were aware of the name of the CV medication and the proper use of the medications, or (b) if they did not know the name of the medications, but they were aware of why they were taking the CV medications.

Lack of knowledge of CV medications was defined if the participants met any of the following conditions for at least one CV medication: They knew the name of the CV medication however, (a) they did not

know the reasons for taking them, or (b) the reasons for taking the medications that the participants stated were pharmacologically or clinically inappropriate.

3.2. Data Analysis

The Statistical Package for the Social Sciences (SPSS-20) was used for data entry and analyses. The researchers reviewed the distribution of the variables and the missing data to evaluate the quality of the data and data entry. Descriptive statistics such as frequencies, percentages, means and standard deviations were calculated to describe the demographics and cultural characteristics, medical diagnoses and health risk behaviors of the study participants.

To meet the first study purpose, the researchers used descriptive statistics to describe whether or not the study participants were aware of the name and the use of the CV medication they were taking. The researchers categorized the name of the CVD medications taken by the participants into eight categories; aspirin, diuretics, beta blockers, calcium channel blockers, angiotensin converting enzyme inhibitors, angiotensin receptor blockers, anticoagulants and lipid lowering agents. For the second study purpose, logistic regression was used to explore the determinants of lack of knowledge of CV medications.

4. Results

The study participants were 99 culturally diverse, elderly residents in four independent living facilities. The majority of the participants was women (n = 82), very old, had graduated from high school or had completed additional education, were living alone and were not employed. Slightly less than half (n = 41) of the participants were born outside the U.S; and most of them preferred to speak their native languages with their health care providers (see Table 1).

"Table 1. Demographic and cultural characteristics of the participants (N= 99)"

Demographics	%	n
Age	**Mean: 81.5 (± 7.4)**	
Women	**82.8**	**82**
High school graduate or more	**70.7**	**70**
Living alone	**70.7**	**70**
Employed: full or part-time	**2.0**	**2**
Ethnicity		
Caucasian, not Hispanic	**49.5**	**49**
Asian-Pacific Islander	**35.4**	**35**
Black, not Hispanic	**4.0**	**4**
Others including Hispanic	**12.1**	**12**
Were you born in the U.S?		

Yes	**58.6**	**58**
No	**41.4**	**41**
Average length of stay in the U.S (n=41) Do you prefer to speak English with your	**Mean: 21.4 (± 16.1) years**	
health care providers? No (n=41)	**65.9**	**27**

The most common medical diagnoses were arthritis (n = 47) and hypertension (n = 46). Average BMI was 26. Less than one third was physically inactive (n = 22) and drinking alcohol (n = 28). The average CAGE score among the drinkers was 0.07 (± 0.258). Only two participants presented a CAGE score of 1; and none were indicated as suffering alcohol dependence. Only five participants were current smokers (see Table 2).

"Table 2. Medical Diagnoses and Health Risk Factors (N= 99)"

	%	n
Current Medical Diagnoses		
Arthritis	**47.5**	**47**
Hypertension	**46.5**	**46**
Diabetes	**20.2**	**20**
High cholesterol	**18.2**	**18**
Depression	**16.2**	**16**
Angina	**11.1**	**11**
Arrhythmia	**3.0**	**3**
Health Risk Factors		
Body Mass Index	**Mean: 26.4 ± 0.6**	
Physical inactivity	**22.2**	**22**
Drinking alcohol beverage	**28.3**	**28**
Current smokers	**5.1**	**5**

4.1. Knowledge of CV medications

Two thirds (n = 66) of the participants were taking at least one or more CV medications. Among these 66 participants, the average number of CV medications being taken was 2.02 (±1.102). The most frequent CV medications were lipid lowering agents and aspirin (see Table 3). Among the participants who were taking CV medications and were able to state the name of the medications, up to 66.7 % of them were either unaware of the reason for these medications or indicating inappropriate reasons for taking them. About one fifth of the participants indicated that they were taking medications for hypertension, high cholesterol and/or heart; however they could not remember the exact name. Approximately 38.4% (n = 38) of the total participants were identified as lacking knowledge of CV medications.

"Table 3. Lack of knowledge of cardiovascular (CV) medications in elderly (N = 99)"

Classification of CV medications % (n)	Aware of the name of the medications reasons (n = varies)	Unaware or inappropriate of taking the medication among the users
I am taking CV medications. 66.7 (66)		
And I know the medication names 47.5 (47)		
Lipid lowering agents 32.3 (32)		15.6 (5)[1]
Aspirin	24.2 (24)	45.8 (11)[2]
Diuretics	16.2 (16)	12.5 (2)
BB/CCB	19.2 (19)	10.5 (2)
ACEI/ARB	20.2 (20)	5.0 (1)
Nitrates	3.0 (3)	66.7 (2)
Anticoagulants	6.1 (6)	50.0 (3)[3]
		19.2 (19)[4]
But I don't know the names 19.2 (19)[5]		
Lack of Knowledge of CV medications 38.4 (38)[6]		

Acronym definitions: beta blockers, BB; calcium channel blockers, CCB; angiotensin converting enzyme inhibitor, ACEI; angiotensin receptor blocker, ARB.

[1] Depression, diarrhea, hypertension, [2] Bone, cholesterol or hypertension, [3] Arthritis, depression, hypertension, [6= 4+5]

4.2. The determinants of lack of knowledge of CV medications

The dependent variable was lack of knowledge of CV medications among the participants who were taking at least one CV medication. The correlation analysis showed that only BMI and history of ever smoking had a statistically significant correlation with the dependent variable. For the multiple logistic regression analyses, participants' demographic variables, health risk factors, and the number of CV medications taken were included, in addition to BMI and history of ever smoking. In this model, BMI and history of ever smoking remained statistically significant determinants of the dependent variable. Drinking alcohol was also statistically significant. Therefore, the participants who had a BMI higher than 25 (OR: 5.46; 95% CI: 1.12, 26.52), were drinking alcohol beverage (OR: 0.075; 95% CI: 0.01, 0.83), or had a history of ever smoking (OR: 54.90; 95% CI: 4.39, 686.29) were more likely to lack knowledge of CV medications. Table 4 provides odds ratio (OR) with 95% confidence interval (CI), using multiple logistic regression analysis with six independent variables that predicted lack of knowledge of CV medications. Other variables such as ethnicity, first language, preferred

language for communication with health care providers, and the number of CV medications being taken were not associated with knowledge of CV medication.

"Table 4. Odds ratio (OR) with 95% confidence interval (CI) using multiple logistic regression analysis with six independent variables that predicted lack of knowledge of CV medications (n=66)"

Variables	OR	95% CI for OR	p-value
Age: ≥ 82	1.418	0.343, 5.867	0.630
		0.163, 24.121	0.592
Gender: Women	1.981		
Level of education: ≥ High school graduation	1.766	0.343, 9.096	0.496
Living alone	0.725	0.142, 3.697	0.699
BMI*	5.460	1.124, 26.517	0.035*
Physical Activity	0.931	0.165, 5.236	0.935
Drink alcohol beverage*	0.075	0.007, 0.826	0.034*
History of ever smoking*	54.901	4.392, 686.288	0.002*
Number of CVD medication taking: ≥ 2	0.517	0.099, 2.694	0.434

*** Statistically significant**

5. Discussion

The participants in this study were aged, mostly women, and very culturally diverse. The study results supported several important findings regarding the participants' knowledge of the CV medications. First, the substantial numbers of study participants were not sufficiently knowledgeable about their CV medications. Lipid lowering agents and aspirin were the most commonly taken CV medications, however 16-46% of the users were not aware of why they needed these medications. Hypercholesterolemia is a chronic metabolic disease that is major risk factor for CVD [23], and it is important that the patients clearly understand the need for life-long management. A previous study reported that side effects were powerful determinants of noncompliance for lipid lowering agents [14]. Therefore, it is important for healthcare providers to educate the clients on the reasons for taking these medications with sufficient information about the common or critical side effects.

Aspirin reduced the risk of any serious vascular event [3; 24] by 32% in high risk patients [25]. A low dose of aspirin (75-150 mg daily) is an effective antiplatelet regimen for long term use, and its absolute benefits substantially outweigh the absolute risks of major bleeding. Lack of knowledge about the benefits of aspirin to CVD can decrease aspirin use and increase the risks of developing CVDs.

In addition, although only a few study participants were taking nitrates and anticoagulants, most of them were not knowledgeable about the benefits of these two medications, which required substantial knowledge of the medication to maintain therapeutic goals and prevent side effects. Lack of knowledge on the reasons why the participants needed to take the medications could be potentially harmful, as described by Yee and colleagues [26]: In their examination of drug-related emergency department visits with 2,169 elderly veterans, they found that the main causes of drug-related visits were adverse drug reactions and that the major medications leading to adverse effects were anticoagulants.

Second, although the present study participants had multiple health problems, they were managing their health risk behaviors well. About one third were drinking alcohol however their CAGE scores were minimal,

indicating a trivial level of alcohol dependence. In addition, very few participants were current smokers. More than two thirds of the participants were physically active, which was substantial considering that half of the participants had arthritis. The significant finding was that the participants with non-healthy behaviors such as being overweight, having a history of ever smoking and drinking alcohol beverages were more likely to be less knowledgeable about CV medications. It should be noted that all of the drinkers were very light drinkers. Only two participants had a CAGE score of 1, and none of the participants was indicated as alcohol dependent.

Lastly, the number of CVD medications being taken and the study participants' cultural characteristics were not determinants of knowledge of CV medications. This finding is consistent with that of Conn and colleagues [27] who studied the association between the medication complexity index that determined the complexity of the patient's medication regimen and medication adherence. Although the two variables were negatively correlated, the link was not statistically significant. In addition, our findings were not consistent with a previous study which presented that ethnic minorities were more often less adherent [13].

In conclusion, the substantial numbers of elderly living in the culturally diverse community lacked knowledge of their CV medications, even of the widely used lipid lowering agents and aspirin. The elderly who preserved healthy behaviors such as maintaining proper body weight and not ever smoking were more likely to have better knowledge about their CV medications. The study results indicated that healthy behaviors were beneficial not only for general health maintenance, but also for maintaining more accurate medication regiments in this aged, culturally diverse population.

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6. References

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