Relationship between Patients' Knowledge about Post Operative Risk Factors after Coronary Artery Bypass Surgery (CABG) and Adherence to Medication and Lifestyle Changes in Armenia

(A cross-sectional study)

Master of Public Health Thesis Project Utilizing Professional Publication Framework

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Abbreviation List

ACE   -   Angiotensin-Converting–Enzyme

BMI   -   Body mass index

BMQ   -   Beliefs towards Medication Questionnaire

BRFSS   -   Behavioral Risk factors Surveillance System

CABG   -   Coronary Atery Bypass Grafting

CAD   -   Coronary Artery Disease

CDC   -   Centers for Disease Control

CHD   -   Coronary Heart Disease

COPD   -   Cronic Obstructive Pulmonary Disease

CVD   -   Cardiovascular Disease

HF   -   Heart Failure

MAS   -   Medication Adherence Scale or Morisky Scale

MI   -   Myocardial Infarction

NMMC   -   Nork Mrash Medica Center

WHO   -   World Health Organization

Acknowledgments

Abstract

Background

      Medication non-adherence is a complex problem, especially for people with chronic diseases. Non-adherence to lifestyle change and prescribed medication may worsen the disease and can prohibit attaining treatment goals sufficiently. As a result, many patients can loose their chance to get an appropriate benefit from medical treatment. This problem may weaken quality of life and increase health care cost. Non-adherence after CABG is a serious problem, too. It may increase the rate of death, myocardial infarction, recurrent angina, stroke, transient ischemic attack, or the need for re-operation.

Aims of the study

      Primary aim - to investigate the prevalence of non-adherence to medication and lifestyle changes among patients with CABG from 2005 – 2006 at NMMC in Armenia.

      Secondary aim - to investigate if the knowledge of patients (who underwent CABG) about postoperative risk factors is associated with their adherence to medication and lifestyle changes, such as quitting smoking, following healthier diet and increasing physical activity.

Methodology

      The study design was analytical cross-sectional. Sample size for this study was 300. *Study population* consisted of CABG patients who underwent bypass surgery from 2005 to 2006 at NMMC in Armenia, who lived in Armenia, were able to and gave consent to undergo telephone interview. Simple random sampling was used to create the list of study population. Data were collected through telephone interviews. Each interview lasted 10 to 15 minutes. *Study Instrument* - Medication Adherence Scale Score was use to measure adherence to medication. Behavioral Risk factors Surveillance System (BRFSS) 2006 was used to measure diet, physical activity and smoking status. Beliefs towards medication were assessed by means of Beliefs towards Medication Questionnaire. Knowledge about post operative risk factors was assessed by asking question about post operative risk factors.

Results

      Mean age of participants was 58 ± 9 years, 85.8% were men. Seventeen and 38.6% of patients adhered to medication by the conservative and less conservative definition, respectively. Hundred seventy six (75.5%) were adherent to smoking cessation. Patients with CABG mostly did not adhere to diet: 11 (4.7%) did not follow prescribed dietary changes. Hundred and nine (46.8 %) of patients was considered physically active. Mean knowledge score was 1.88 ± 1.32 (min 0; max 6).

Logistic regression was performed to identify the association between knowledge and outcome variables.

No statistically significant association was found between knowledge and adherence to medication. There is statistically significant association between medication affordability and adherence to medication by conservative definition, (OR = 3.021, CI = 1.278; 7.141). Statistically significant association was identified between knowledge and smoking cessation (OR = 1.716, CI = 1.235; 2.386). Estimated odds of adherence to diet increases by 63.9%, in each knowledge score increase, OR = 1.639, CI = 1.007; 2.667.

Conclusion

The study revealed positive association between patients' knowledge and adherence towards diet and smoking cessation. This finding coupled with results of previous studies allows us to recommend additional patient education measures to address the gap in knowledge of post-operative risk factors in patients with CABG. Further, more research is needed to see whether adherence to medication and lifestyle changes have impact on health outcomes.

1. Introduction

1.1 Background/ Literature Review

Coronary artery disease (CAD), also called coronary heart disease (CHD), ischemic and atherosclerotic heart disease, is one type of cardiovascular diseases (1;2). It occurs when hard cholesterol substances, called "plaque", buildup on inside layers of the arteries. As a result coronary arteries become narrowed, and blood flow to the heart muscle can slow down or stop. Symptoms of CAD include chest pain (angina pectoris) from insufficient blood flow to the heart and heart attack (acute myocardial infarction) (3). CAD is a common form of heart disease (4) and is a major cause of mortality and morbidity throughout the world (3).

Cardiovascular disease is the number one cause of death globally. Mortality from cardiovascular diseases reached 17.5 million in 2005, which is 30% of all global deaths (5). WHO estimated that if no appropriate action is taken, 20 million people will die from cardiovascular disease every year by 2015 (6).

According to the WHO, in 1999 there were 7.1 million deaths from coronary heart disease globally. In 2001 there were 7.2 million deaths from heart disease. The WHO predicts 11.1 million deaths from coronary heart disease in 2020 (6). WHO reports that heart disease and stroke kill 17 million persons every year (7). It is expected that CAD mortality rates will double from 1990 to 2020, with approximately 82% of the increase attributable to the developing world (8).

The latest World Health Organization statistics show that 23% of deaths counts for coronary heart disease in women, 18% for stroke, and 15% for other cardiovascular disease. Similar situation was found for men (5).

Coronary artery bypass grafting (CABG) has become a standard method of treatment of CAD and was performed since 1967(3). Each year 800,000 patients undergo CABG in the world (8). It reduces angina and stabilizes ventricular functions (8). According to Mark M.Levinson, "the goal of this operation is to restore the blood supply to the heart muscle by creating a new

rout for the blood to flow around the blockages"(3). The famous vascular surgeon, Alexis Carrel was the first one who gave the idea about direct connection to the coronary artery. He reported his effort about suturing carotid artery graft to the American Surgical Association in 1910. Over 50 years this contribution stayed unnoticed. Alexis Carrel was honored with the Nobel Prize in Medicine for developing the techniques of vascular surgery (3).

After CABG patients may be at risk for angina, myocardial infarction, or stroke, as well as for cognitive deterioration and depression. All patients are advised to take aspirin after CABG. Patients with a history of myocardial infarction should take beta-blocker, while high risk patients are advised to take angiotensin-converting–enzyme (ACE) inhibitors. All patients should be encouraged to change their lifestyle (diet, weight reduction, cessation of smoking, exercise and stress management) (9). About 22 percent of CHD globally is caused by physical inactivity and 21 is attributable to body mass index (BMI) above 21 kg/m (10).

1.2 Non-adherence as a complex problem

Medication adherence has been monitored since the time of Hippocrates, when people tried to find the effect of different drugs taking into account the notion of medication taking behavior (11).

Many terms have been used to describe medication taking behavior such as compliance, adherence, intelligent compliance, and drug forgiveness (12). "Compliance" was the first term used to describe this phenomenon. Sackett and Haynes defined compliance, almost 25 years ago, as "the extent to which a person's behavior (in terms of taking medications, following diets or executing other life-style changes) coincides with medical or health advice" (13). Later, many health care providers criticize the term "compliance", because "compliance" suggests that the patients are passively following the doctor's orders (11). The meaning of adherence is mostly based on respective and collaborative relationship between doctors and providers (13). WHO revised old definition and now defines adherence as "the extent to which a person's

behavior – taking medication, following a diet and/or executing lifestyle changes – corresponds with agreed recommendations from a health care provider"(13).

This study uses the word "adherence" referring to patient's behavior of taking medication, following diet and other lifestyle changes.

Medication non-adherence is a complex problem, especially for people with chronic diseases (14;15) resulting in significant morbidity and mortality (12). In general, adherence among patients with chronic conditions is very low and it declines significantly after the first six months of therapy (11;16).

According to Sluijs et al, "the problem of non-adherence to medical treatment remains a challenge for the medical professions" (16). Non-adherence to lifestyle change and prescribed medication may worsen the disease (11) and can prohibit attaining treatment goals sufficiently (17). As a result of non-adherence patients do not get an appropriate benefit from medical treatment (17). Non-adherence may result in poor health outcome, weaken quality of life and increase health care cost (17). According to the Lars Osterberg, people who do not follow medication treatment have poor health outcome than those who do (11). A recently published study found that higher rates of medication adherence were associated with lower rates of hospitalization and a reduction in total medical costs among people who have chronic conditions such as diabetes, hypertension, and cognitive heart failure (14).

In the United States 33% to 69% from all medication related hospital admissions are due to poor medication adherence (11), which costs $100 billion a year and leads to thousands of serious adverse events or deaths each month (11;12). Approximately 125 000 deaths occur in the US due to non-adherence with cardiovascular medications annually (14).

1.3 Non-adherence after CABG

As there is an association between medication use and patients outcome after CABG, it is important to take an appropriate care in terms of taking medication (18). A study was conducted to see whether there is an association between medication use and improved health outcome after

CABG. According to the results of this study, patients with low adherence to medication after CABG had a significantly higher 2-year rate of death or myocardial infarction than those taking all indicated medications (8.0% versus 4.2%; adjusted hazard ratio, 1.69; 95% confidence interval, 1.12 to 2.55; p = 0.013) (18).

It is estimated that early aspirin therapy after CABG reduce the incidence of myocardial infarction by 48 percent, the incidence of stroke by 50 percent, renal failure by 74 percent, bowel infarction by 62 percent (19).

Beta-blockers reduced one-year mortality from 12 percent to 4 percent among patients who underwent CABG after myocardial infarction (9).

It is also important to follow and maintain lifestyle changes in order to reduce cardiovascular risk especially after CABG. Smoking after CABG may reduce survival benefit: people who smoke after CABG have less survival benefit than those who stopped smoking: patients who quit smoking after CABG have survival benefit of 3 to 5 percent at 5 years and 15 percent at 10 to 20 years compared with those who continued to smoke. Smoking cessation may decrease the risk of repeated CABG and myocardial infarction (9).

According to the findings of prospective, randomized, controlled trial, lifestyle change (low-fat vegetarian diet, stopping smoking, stress management training, and moderate exercise) improved health condition among people with severe coronary atherosclerosis after one year (20).

In general, non-adherence of medication after CABG may increase the rate of death, myocardial infarction, recurrent angina, stroke, transient ischemic attack, or the need for re-operation (9).

Taking into consideration the importance of dealing with poor adherence to medication, World Health organization published guide for clinicians, health care managers, and policy makers how to improve medication adherence (11).

Many factors are associated with adherence such as age, gender, personality (21), knowledge (22;23), beliefs towards medication (24), health status and disease, education (25), characteristics of the medicines(21), economic variables(26), and physicians variable(21).

1.4 Magnitude of the problem

After reviewing 50 years of adherence research findings from 1948 to 1998, DiMatteo calculated adherence rates in a meta-analysis of 569 studies. Overall non-adherence rate was from 24.8% to 40% (16;21). Based on the results of this meta review medication adherence was 80% in cancer patients and about 75% among people, who suffer from cardiovascular, infectious disease, diabetes mellitus etc (16).

Another study was conducted to describe medication – taking behavior of patients, who have acute coronary syndrome and to determine the relationship between self-reported adherence and patients characteristics (27). Two hundred eight patients participated in the study. The mean Medication Adherence Scale MAS (28) was 1.3 ± 0.4, with 53.8% indicating non-adherence (27).

1.5 Situation in Armenia

According to the WHO report in 2002, cardiovascular diseases have high mortality in Armenia, too. From all deaths because of non-communicable diseases 62.2% are due to cardiovascular disease, while mortality of non-communicable diseases is counted 88.4% in Armenia. Sixty-one percent of all cardiovascular deaths are due to ischemic heart disease (see Figure1) (6).

Since 1996, CABG has been performed at the Nork Marash Medical Center (NMMC) of Armenia. Approximately 400 patients undergo CABG each year at NMMC. Patients come to NMMC to undergo CABG from different parts of Yerevan and from other cities and villages of Armenia.

Much is known about disease and bypass surgery (3), but the extent of adherence to medication and lifestyle changes as well as relationship between patients' knowledge about post-operative risk factors and adherence has not been assessed in Armenia yet.

Figure 1. Mortality rate of Cardiovascular diseases in Armenia, 2002 (WHO)
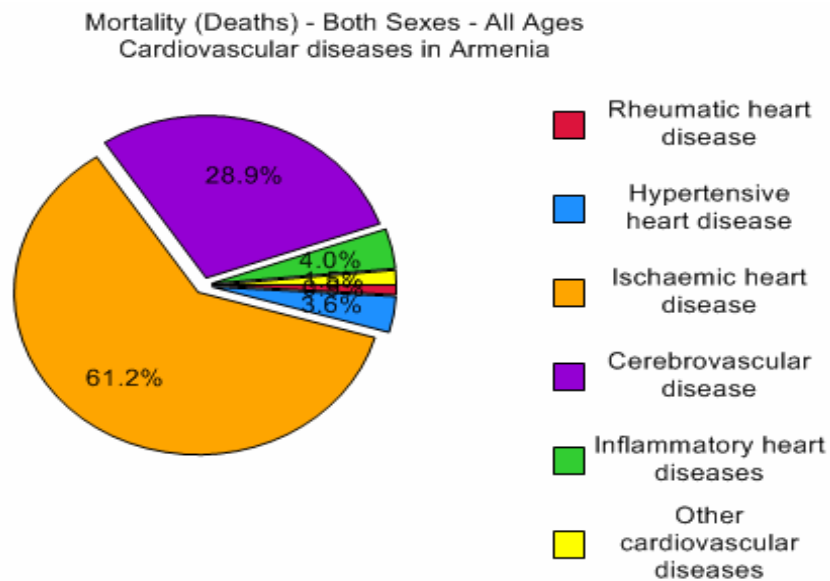
A study was conducted in Sweden, 2006; Malmo University Hospital to investigate whether there is a correlation between patients' specific knowledge about risk factors of coronary heart disease and self-reported lifestyle changes and adherence to prescribed drugs. 509 men and women below 71 years were included in the study. The medical records of those participants, who were hospitalized for a cardiac event, were screened. Based on the finding of this study there were significant correlations between specific knowledge and self-reported lifestyle changes and adherence to prescribed drugs (23).

Since 2005 NMMC has began to distribute brochures among patients who undergo CABG, which contains information about post-operative risk factors such as diet, smoking, and physical activity, stress and lifestyle changes.

1.6 Aims of the study

Primary aim

- To investigate the prevalence of non-adherence to medication and lifestyle changes among patients with CABG from 2005 – 2006 at NMMC in Armenia.

Secondary aim

- To investigate if the knowledge of patients (who underwent CABG) about postoperative risk factors is associated with their adherence to medication and lifestyle changes, such as quitting smoking, following healthier diet and increasing physical activity.

It was already mentioned that many factors are associated with adherence. This study focused on factors such as age, gender, knowledge, education, beliefs towards medication, socio-economic condition and co-morbidities (hypertension, diabetes and other diseases such as chronic obstructive pulmonary disease (COPD), acute myocardial infarction (MI) and heart failure (HF)) to identify an association between knowledge and adherence (Figure 2).

Figure 2. Conceptual Framework
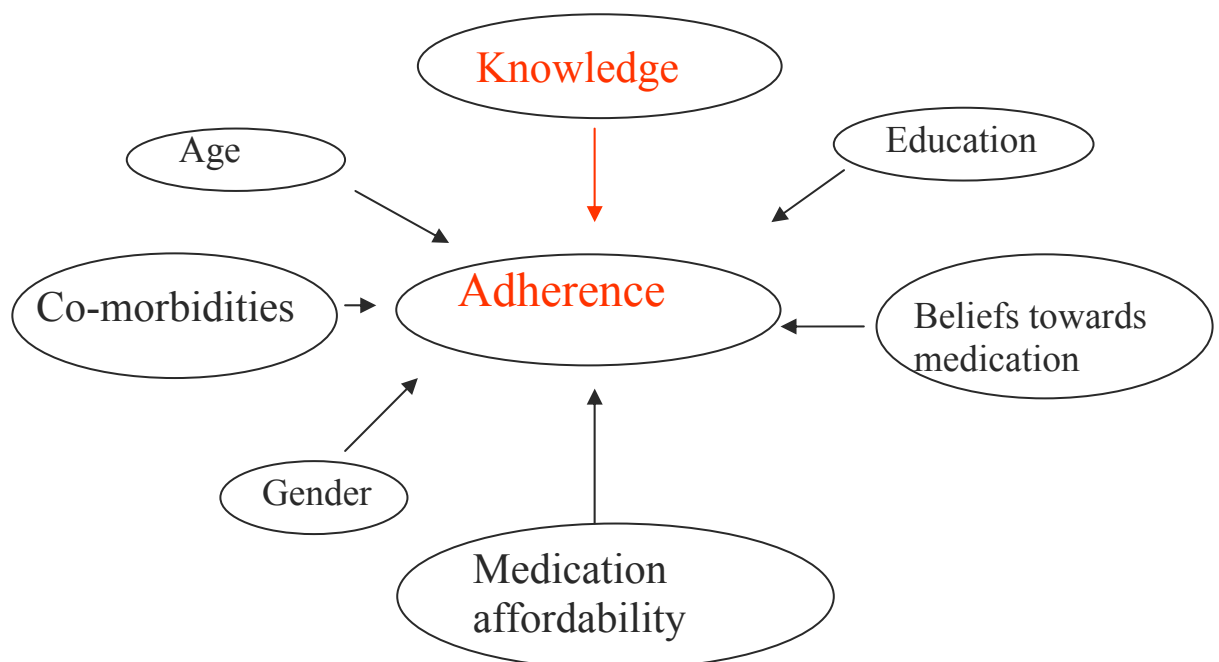
2. Methodology

2.1 Study design

The study design was analytical cross-sectional. As the primary aim of the study was to estimate prevalence of non-adherence and since all measurements on a study subject are completed at one point in time, the study is cross-sectional by design. Current study is more analytical, because in addition to descriptive characteristics of study participants, it attempts to identify an association between knowledge and adherence (29).

Cross-sectional study design has following advantages: it is cheap and quick, requires only a "one-time" interview, it is useful in determining associations between variables of interest, ethically safe and attrition is not an issue (30;31). This study design has some disadvantages such as do not separate cause-effect relationships in the associations, deals only with survivors, not useful for rare cases, susceptible for recall bias, confounders may be unequally distributed between groups and differences may be due to age/time effects or cohort effects (30;31).

2.2 Study population

Target population of the study includes patients who underwent CABG in Armenia. *Sampling frame* includes patients who underwent CABG from 2005 - 2006 years at NMMC. *Study population* consisted of CABG patients who met exclusion and inclusion criteria. The following inclusion criteria were applied to select the study population:

1. Patients, who underwent bypass surgery from 2005 to 2006 at NMMC in Armenia.

2. Patients who were living in Armenia.

4. Patients who were able to and give consent to undergo telephone interview.

Exclusion criteria:

1. Patients with valve, aortic or other type of heart surgery.

2. Patients of other nationalities.

Rationale for choosing the study population

As the patients with CABG are considered a vulnerable group in terms of adherence, (9) the study focused on patients with CABG. In addition to this the study tries to have more homogeneous study population preferring patients with isolated CABG. The logic behind it was a possible difference in adherence for patients with CAD and patients who underwent any type of heart surgery.

This study included patients from 2005 – 2006 taking into consideration the quality of data. NMMC suggests that the data are more reliable from 2005. Brochures about post-operative risk factors were distributed starting from 2005. As the amount of prescribed medicine will decrease year by year, the study includes patients from 2005 to detect 1- to 2-year adherence.

Since among patients with chronic conditions adherence declines significantly after the first six months of therapy (11;16), 2005-2006 patients were chosen as the study population to ensure at least six months since surgery at the time of the data collection.

2.3 Sampling Methodology

NMMC provided information about patients with CABG. The demographic data have been systematically recorded in the cardiovascular information registry at NMMC.

As the study deals with the list of patients with CABG, it was planned to make some judgments about the completeness of the list and to exclude people who did not meet inclusion criteria, who have duplicate names, blank or incomplete information on certain individuals and those who died at the hospital (information about hospital deaths was available).

Simple random sampling was used to create the list of potential study participants, which included names of patients, phone numbers, date of surgery and co-morbidities.

2.4 Sample size: Aim 1

First aim was to investigate the prevalence of non-adherence to medication and lifestyle changes among patients with CABG from 2005 – 2006 at NMMC in Armenia. To calculate sample size taking into account first aim of the study *single sample size formula for test of proportion* was used (32).

As the average non-adherence rate was from 24.8% to 40% for general population (16;21), sample size was calculated taking into account the range of proportion under the null hypothesis from 0.25 to 0.40 to detect 10% to 15% difference between the null and the alternative value for 80% power to detect the true difference and allowing for 5% type I error.

Proportion Non-Adherence under Ho	$\Delta = 0.10$	$\Delta = 0.15$
0.25	156	71
0.30	172	77
0.35	183	81
0.40	196	85

An example of the calculation is below:

Proportion Non-Adherence for general population, H_0, $\rho_0 = 0.40$

Proportion Non-Adherence among people with coronary disease Ha, $\rho_a = 0.50$

$\Delta = \rho_a - \rho_0 = 0.10$

Significance level, $\alpha = 0.05$ (two-sided) and power $(1 - \beta) = 0.80$

$$n = \frac{(1.96\sqrt{0.4 * 0.6} + 0.84\sqrt{0.50 * 0.50})^2}{(0.10)^2} = 196$$

For primary aim of the study the maximum calculated sample size was chosen, 196.

Sample size: Aim 2

Second aim was to investigate if the knowledge of patients (who underwent CABG) about postoperative risk factors is associated with their adherence to medication and lifestyle changes quitting smoking, following healthier diet and increasing physical activity.

To have 80% power to detect 20 % true difference in proportion of not adhering patients between the two knowledge (high and low) groups , sample size was increased to 230 (115 in each group) using the sample size formula for two groups for hypothesis test. Definition of those two knowledge groups are the following: people, whose knowledge score is less than mean, will be considered as having low knowledge and whose score is greater than mean, will be included in the high knowledge group. In the calculations equal sample size in each knowledge group was assumed, 80% power, and 0.05 level of statistical significance. For secondary aim of the study sample size equal to 230.

After adjusting for 80% response rate and 90% eligibility rate, sample size increased to 300.

2.5 Study Instrument

Medical records were reviewed to obtain data on date of surgery and co-morbidity status (diabetes, hypertension and other diseases). Study instrument (questionnaire) also included information about age, gender, education, and diet and medication affordability. Additionally, it measured the following: patients' knowledge about post operative risk factors, smoking status before and after surgery, dietary habits, physical activity status, beliefs in and adherence towards medication.

Patients' knowledge about post operative risk factors was measured by asking the following question: "Can you tell me the major causes of heart disease?" (25). Six modifiable risk factors were listed: fat in food (including poor diet, too much fat and too much cholesterol), lack of exercise, excess weight, elevated blood cholesterol level and high blood pressure. The question also had "others" option with an opportunity to record the response. When the respondents mentioned no risk factor, it was considered that they do not know about risk factors of heart disease.

Questions about smoking, diet and physical activity were taken from Behavioral Risk factors Surveillance System (BRFSS) 2006. To measure respondents' smoking status they were asked the following questions: "Have you smoked before surgery" and "How often do you

smoke now?" The study participants were classified as never, former, occasional and current smokers.

Five questions were asked to see whether patients adhere to diet or not. Participants were asked to report their consumption frequency of five foods: fruit, fruit juice (such as orange, grapefruit, or tomato), carrots, green salads and other vegetables (33). The study focused on fruit and vegetable intake, because it is associated with reductions in CVD (33). Each participant answered how frequently he or she consumed each of the items: every day, every week, every month or every year. When participants reported total of five servings per day, it was considered as fully adherent based on recommendations from the U.S. Department of Health and Human services and the American Heart Association (33).

Respondent were asked questions about moderate physical activity like "In a usual week, do you do moderate activities for at least 10 minutes at a time?". Then questions were asked about the frequency and duration of each activity. Participants were classified as fully adherent if they were moderate active at least five days per week for at least 30 minutes per day based on recommendations from the Centers for Disease Control and prevention (CDC) and the American College of Sports Medicine (33).

To determine beliefs towards medication, previously validated Beliefs Towards Medication Questionnaire (BMQ) was used (27). The BMQ consists of 18 items with four parts: Specific Necessity, Specific Concerns, General harm, and General overuse. Each BMQ item uses a 5 – point Likert Scale (from 1 = strongly agree to 5 = strongly disagree). The lower BMQ scale is the higher beliefs towards medication (27).

Medication Adherence Scale (MAS) or Morisky scale was used to measure adherence to medication (28;34). MAS consist of four items, which address reasons of non-adherence such as forgetfulness, carelessness, or stopping medications because they feel better or worse. The lower the MAS score is the better adherence to medication.

The instrument was translated into Armenian and pre-tested among seven patients. After pre-testing minor changes were made; wording of some of the items was improved and questions about affordability of food and medications were added.

2.6 Data collection

Phone survey was performed to carry out interviews. The data were collected in June and July 2007 by two interviewers. Each interview lasted 10 to 15 minutes. Oral consent was obtained before each interview. If a participant did not have time to talk, a call was made at another time. Overall, three attempts were made to initiate the interview. Afterwards it was considered that participant refused to answer.

3. Ethical Considerations

The Institutional Review Board Committee on Human Research of the College of Health Sciences of the American University of Armenia reviewed and approved the study. The current study did not include sensitive questions. Oral consent form was used prior to asking questions. Participants could refuse to participate or withdraw from the study at any time. Detailed information was provided about confidentiality.

4. Analysis

Data entry and recoding were performed using SPSS 11.0 statistical package. Statistical analysis was done by SPSS 11.0 and STATA 8.0.

Descriptive statistics were used to summarize participants' baseline characteristics and adherence estimates. Mean $\pm$ SD are presented for continuous variable and frequencies for categorical variables.

Adherence to Medication

Medication Adherence Scale (MAS) score was created based on respondents' answers to the relevant questions. All "yes" answers were coded "1"; all "no" answers - "0". If respondents gave "no" answer, it meant that they did not forget to take medication, were careful taking medication, did not stop taking them if they feel better or feel worse. All "yes" answers were

added to create MAS score. The less the MAS score is, the higher the adherence to medication.

The range of MAS score is from 0 to 4. In the data analysis adherence to medication was

defined in two ways. Conservative definition of adherence to medication corresponded to MAS

score = 0, which meant that participants answered negatively to all non-adherence questions.

Less conservative definition of adherence to medication corresponded to MAS score = 1 and 0.

This definition allowed only 1 positive answer to any of the four non-adherence questions.

Beliefs towards Medication

Mean belief score was created based on the scores of belief towards medication questions.

The lower the mean score is the higher beliefs towards medication.   Mean belief score was a

continuous variable and had normal distribution.

Knowledge Score

Knowledge score was created based on the number of correctly identified post – operative

risk factors for CAD. As the question had also "others" option except for the stated six risk

factors, all right answers were added to generate knowledge score.

Smoking Cessation

To analyze the data about smoking this study focused on smoking cessation after surgery.

Former and never smokers are classified as adherent to smoking cessation and were coded "1",

while people who were occasional smokers or did not quit smoking were considered as non-

adherent to smoking cessation and were coded "0".

To estimate the total effect of knowledge about post operative risk factors (per unit score)

on adherence to medication, smoking, physical activity and diet, the analysis adjusted for all

potential confounders. Different factors are associated to the outcomes adherence to medication

(Fig.2), diet (Fig. 3), physical activity and smoking cessation (Fig. 4). To diagnose confounding,

potential association between those factors and knowledge about post operative risk factors

(main predictor) was assessed through linear regression. For adherence to medication

confounders were *education, age, beliefs towards medication and medication affordability. Age*

and education were potential confounders for diet, physical activity and smoking cessation. After checking for confounders the data analysis considered potential effect modification in the association between knowledge and outcomes. Gender and presence of co-morbidities were checked as potential effect modifiers of the relationship between knowledge and adherence to medication, knowledge and physical activity, and knowledge and smoking cessation association. Diet affordability, gender and co-morbidities were checked as effect modifiers for knowledge and diet association.

5. Results

A total of 300 patients were planed to be enrolled in this study, while 233 patients out of 300 have complete interviews. Out of remaining 67, 11 (3.7%) patients refused to participate in the study, 4 patients were dead, 31 patients did not respond (no answer, wrong number or changed living place), and 21 patients were out of country.

Mean age of participants was 58 ± 9 years, 85.8% were men. Twenty – eight percent had high school or less educational status, 18.5 % of subjects had college degree or equivalent, and 53.2 % had higher / tertiary education. Out of the total sample 167 (71.7 %) have received educational brochures about post operative risk factors. Hundred ninety five patients included in the sample had various co-morbidities, such as diabetes (15%), hypertension (70.4%), both diabetes and hypertension (10.3%) or other co-morbidities: chronic obstructive pulmonary disease (COPD), acute myocardial infarction (MI) and heart failure (HF) (24%) (Table 1).

Adherence to medication

Table 2 shows the number of patients, who answered "yes" to each medication adherence question. Thirty-nine percent of study participants forget to take medication, 41% were careless about taking medication, 50% stopped taking medicine, when feeling better, and 75% stopped taking medicine, when feeling worse.

Seventeen percent of patients adhered to medication by the conservative definition and 38.6 % of patients adhered to medication by less conservative definition (Table 3).

Only 95 (40. 5 %) of patients responded that they stopped taking medication because they were not able to afford it.

Smoking, diet, and physical activity

Hundred and six out of 163 former smokers stopped smoking after surgery, 41 of them continued smoking every day and or smoked occasionally (16 patients). Remaining 70 patients out of 233 were never smokers. Former and never smokers (176 (75.5%) of patients) were considered adherent to smoking cessation.

Patients with CABG mostly did not adhere to diet: 11 (4, 7%) out of 232 (one missing value) did not follow prescribed dietary changes. For 130 (55. 8 %) of patients dietary food was affordable.

As far as physical activity status is concerned, nearly half of subjects exercise regularly. 109 (46, 8 %) of patients can be considered physically active.

Knowledge about post operative risk factors

No risk factor was mentioned by 35 respondents, 67 stated only one correct risk factor, and 1 mentioned all six risk factors (Table 4). Mean knowledge score was 1.88 ± 1.32 (min 0; max 6).

Table 5 shows frequency of mentioned risk factors. The most frequently mentioned risk factors were cholesterol level, stress and smoking. Fat in food was mentioned by 55 patients. Mean belief score was 2.73 ± 0.48. The highest score was 3.94 and lowest one 1.44.

Regression Analysis

Logistic regression was performed to identify the association between knowledge about post operative risk factors for CAD and adherence to medication, diet, physical activity and smoking cessation. Knowledge score was used as continuous in the main analysis and dichotomous variable in the supplementary analysis. Since dichotomizing knowledge score did not add to the interpretation of the result, it was decided to present knowledge as continuous variable.

Age was analyzed as continuous variable. The relationship between adherence to medication and age was examined using non-parametric lowess function in Stata. In general, there was positive relationship between adherence to medication and age. After 75, the relationship between age and adherence to medication became negative (see figure 5). In our dataset only three people were identified as being over 75. In order to avoid influence of these extreme observations on the relationship between adherence to medication and age it was decided to additionally exclude those people from the data analysis when looking at the association between knowledge and adherence to medication.

Unadjusted effects of knowledge on adherence to medication, smoking, physical activity and diet using both conservative and less conservative definition for adherence to medication are presented in Table 6. Estimated odds of adherence to medication increases by 2.4 % for each knowledge score increase using conservative definition, OR = 1.024, (95% CI = 0.790; 1.328). Data shows 13.3 % increase in estimated odds of adherence to medication by less conservative definition in each knowledge score increase OR = 1.133, CI = (0.928; 1.384). In both cases, however, possibility of no effect could not be ruled out as evidenced by the confidence intervals.

Outcome 1. – Adherence to medication

Table 7(a,b) and 8 show the adjusted effect of knowledge about post operative risk factors (per unit score) on adherence to medication by conservative and less conservative definitions, respectively. After adjusting for age, education, mean beliefs score and medication affordability, the effect of knowledge on adherence disappeared. Out of all factors, medication affordability showed the largest effect on adherence: 3.01 higher odds of adherence for those to whom medication was affordable (OR = 3.01, 95% CI =(1.278; 7.141)).

The following model with interaction was considered as well (Table 7b):

$$Log(Adherence) = \beta_0 + \beta_1 knowledge + \beta_2 age + \beta_3 highschool + \beta_4 college + \beta_5 beliefs + \beta_6 medafford + \beta_7 co-morbidityb oth + \beta_8 co-morbidity * knowledge$$

Estimated odds of adherence to medication increases by 14% for each knowledge score increase among people, who do not have both diabetes and hypertension after adjusting for confounders. Estimated odds of adherence to medication decreases by 81% for each knowledge score increase among people, who have both diabetes and hypertension after adjusting for confounders ($e^{\beta_1} * e^{\beta_3} = 1.141 * 0.169 = 0.19$). Estimated odds of adherence to medication is 9.01 times higher among patients who have both diabetes and hypertension compare to patients who do not have (OR = 9.010, CI =1.406; 57.754) among those with 0 knowledge score. People who suffer from diabetes and hypertension modify an association between knowledge and adherence to medication by conservative definition (OR = 0.169, CI =0.035; 0.803). Estimated odds of adherence to medication is increased by 34.9% (OR = 1.349, CI = 0.543; 3.351) and 7.2% (OR = 1.072, CI = 0.545; 2.109) among people who have high school education compare to people who have higher / tertiary education by conservative and less conservative definition respectively. There is statistically significant association between medication affordability and adherence to medication by conservative definition, (OR = 3.021, CI = 1.278; 7.141).

No effect modification was found by people who have both diabetes and hypertension on the association between knowledge and adherence to medication by less conservative definition of adherence. After adjusting for all identified confounders, estimated odds of adherence to medication was increased by 11% (OR = 1.110, CI = 0.899; 1.370) for each knowledge score increase by less conservative definition respectively.

Outcome 2 – smoking cessation

Table 9 shows adjusted effect of knowledge about post operative risk factors (per unit score) on smoking cessation. Statistically significant association was identified between knowledge and smoking cessation OR = 1.532, CI = 1.179; 1.991 after adjusting for confounders such as age and educational status. Estimated odds of smoking cessation is 2.46 times higher

among people who have college education compare to people with higher / tertiary education (OR = 2.457, CI = 0.958; 6.300).

No effect modification was identified by gender and co – morbidities status on the association between knowledge and smoking.

Outcome 3 – physical activity

No association was found between knowledge and physical activity after adjusting for age and educational status, OR = 0.993, CI = 0.809; 1.219 (Table 10).

No effect modification was identified by gender and presence of co – morbidities status on the association between knowledge and physical activity.

Outcome 4 - diet

Estimated odds of adherence to diet increases by 63.9%, in each knowledge score change after adjusting for confounders, OR = 1.639, CI = 1.007; 2.667 (Table 11). No effect modification was identified by diet affordability, gender and co-morbidity status on association between knowledge and diet. Estimated odds of adherence to diet increases by 24 % among people with high school education compare to people with higher / tertiary education OR = 1.239, CI = 0.262; 5.872.

No association was found between knowledge of post-operative risk factors and having received educational brochure at NMMC. Since about 72% receive educational brochures, groups who did and did not receive the brochure were not comparable in their size. Therefore, a variable representing whether patient received the brochure was not included in the regression analysis.

6. Discussion

Current study aimed to estimate prevalence of adherence to medication and behavioral changes, such as healthy diet, increased physical activity and smoking cessation after CABG in Armenian patients. In addition, the study revealed positive association between knowledge of post-operative risk factors and adherence to medication, smoking and diet.

The prevalence estimates for adherence to medication differed from those in other studies. Approximately 39% of patients adhered to medication by less conservative definition that allowed for at most one positive response to non-adherence questions. Anchal Sud et al report 46% adherence to medication by Morisky Scale among patients with acute coronary syndrome. Patients were discharged from a large Midwestern academic health system from January 2002 to May 2003. In one prospective study Duke CERTs has shown that only 21% of patients with CAD reported consistent use aspirin, beta-blockers and lipid lowering therapy in US (data were retrieved from Duke Databank for Cardiovascular Disease) (35). We hypothesized that several factors can potentially account for the difference in these estimates. First possible reason for getting different result is the definition of adherence. In current study MAS Score was taken as dichotomous variable, while one in above mentioned studies; it was described as continuous variable with Lickert scale. Besides, in comparable studies adherence to medication was measured for different drug categories. Second possibility is the cultural aspect: Western and Armenian populations might not be comparable in their medication-taking behavior. Third reason may be the difference in study populations. The abovementioned studies were conducted among patients with acute coronary syndrome and CAD, while this study dealt with CABG patients. Finally, as the study measures adherence to medication by self – reported instrument rather than by a more objective measure, it is possible to over-report in adherence.

Similar to other studies, an association was identified between knowledge and adherence to medication (22;23). Significant association was found between medication affordability and adherence to medication in current study. Due to relatively high prevalence of low socio-economic condition in Armenia, it is reasonable to see poor adherence to medication because of non-affordability. However, after adjusting for self-reported medication affordability, we could still identify a positive relationship between knowledge of coronary risk factors and medication adherence.

As far as the three behavioral factors such as adherence to healthy diet, physical activity and smoking cessation are concerned the current study found different rates of adherence. According to the results of this study, about 5% of people adhere to diet recommendations, while Rosalie R.Miller et al report significantly different rates of adherence of 19%, 22%, and 23% for BRFSS respondents in the years 1990, 1994, and 1996 in a sample of U.S. population. Serour M. et al reports 36.5% adherence to diet among patients with high risk of cardiovascular disease in Kuwait (17). The possible reason for the discrepancy is cultural difference in the populations. Armenian cuisine includes lots of fatty and fried food, which make it hard to follow dietary recommendations. No association was identified between diet affordability and adherence to diet after adjusting for knowledge, age and education. For 130 (55. 8 %) of patients dietary food was affordable, while 5% of patients adhere to diet.

Statistically significant association was found between knowledge and adherence to diet. This association was identifiable even having very small number of people who adhere to diet.

Similar to other studies, estimated 76% of patients were considered as adherent to smoking cessation. Rosalie R. Miller et al report that 80% of people with CHD were current non-smokers. Statistically significant association was found between knowledge and smoking cessation.

Current study found that about 47% of patients adhere to physical activity recommendations. The result is higher compared to other studies (17;33). Rosalie R. Miller et al report that 21% of patients with CHD were adherent to physical activity recommendations. Serour M et al report that 35.6% of patients with high risk of cardiovascular diseases were not participating in regular exercise. As the study measures adherence to physical activity recommendations by self – reported instrument, it is possible to over-report adherence to physical activity. No association was identified between knowledge and adherence to physical activity recommendations in the study population.

Prevailing risk factors for CAD mentioned by respondents were cholesterol level (36.5%), stress (33.5%) and smoking (32.6%). The rate of mentioned risk factors for CAD is lower in current study population compare to other studies (25;36). According to the report of Potvine et al most frequently mentioned risk factors were fat in food (60%), smoking (52%), and lack of exercise (41%) among the Canadian population (25). Potvine et al used the same question to measure knowledge about post – operative risk factors of CAD. Kirkland SA et al report that greatest proportion of participants mentioned smoking and stress as major risk factors of heart disease, (41% and 44% respectively) (36).

The other studies suggest that there is a significant association between beliefs about medication and adherence to medication (24). This study did not identify this association after adjusting for knowledge, age, education and medication affordability.

The results of the current study are least likely to be influenced by selection bias, because simple random sampling was used to create the list of study participants. Low rate of refusals also support this assumption. It is assumed that people who are in the study are not differing from people who are not by their characteristics in terms of their knowledge and adherence status.

In spite of the fact that this study assesses patients' behavior in terms of taking medication, adhere diet, physical activity and smoking, not something related to quality of surgery or medical care at the center, the study findings still have limited generalizability, because the data for this study was obtained from one medical center. As NMMC is distributing brochures among patients with CABG, patients with CABG at NMMC may have high knowledge of post operative risk factors compare with those who underwent surgery at any other centers.

7. Study limitations

One of the limitations of the study was the knowledge assessment tool. Having only one question, that measured patients' knowledge about post operative risk factors, may underestimate

the level of knowledge in the population. In spite of the fact that current study added "others" option in knowledge assessment question to be able write down all responses, it is still possible that this approach was not sensitive enough to allow us to identify all known risk factors. Consequently, this may be the reason for not detecting statistically significant association between knowledge and adherence to medication or between knowledge and adherence to physical activity.

Second, self-reported information regarding risk factors of CAD and adherence to diet, physical activity and medication use is subject to reporting bias. Besides, the study might over-estimate patients' behavior in terms of adherence. Patients may be more apt to answer that they adhere to prescribed medications and life-style changes instead of having to give a negative answer to the adherence questions.

8. Conclusion and recommendation

After CABG, a small number of patients adhered to medication and not all patients adhere to lifestyle changes in Armenia. According to this study finding patients' knowledge is associated with adherence. This conclusion is supported by previous research. Therefore, it is reasonable to believe that additional patient education might not only address the gap in knowledge about post-operative risk factors, but also improve adherence to life-saving medications and important life-style changes. This study also recommends implementing further research to look at change of adherence over time taking into account time since surgery as well as to assess the impact of adherence to medication and lifestyle changes on health outcomes.

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Appendix 1. Tables

Table 1. Demographic and other characteristics of study sample

Variable	Result
Age, y, mean $\pm$ SD	58 $\pm$ 9
(min; max)	(31; 84)
Gender, n (%)	
male	200 (85.8)
female, n (%)	33 (14.2)
Educational attainment, n (%)	
high school and less,	66 (28.3)
some college / technical school	43(18.5)
higher / tertiary education	124 (53.2)
Comorbid condition, n (%)	
Hypertension	164 (70.4)
Diabetes	35 (15)
Both hypertension and diabetes	24 (10.3)
Others	56 (24)

Table 2. Medication Adherence Scale Score for individual Scale Items

Item	Result
Forgot to take medication, n (%)	89 (39.2)
Careless about taking medicine, n (%)	95 (40.8)
When feeling better stopped taking medicine, n (%)	117 (50.2)
When feeling worse, stopped taking medicine, n (%)	176 (75.5)

Table 3. Medication Adherence Scale (MAS) Score of patients with CABG

Medication Adherence Scale (MAS) score	Number of respondents	%
0	39	16.7
1	51	21.9
2	57	24.5
3	56	24
4	30	12.9

Table 4. Knowledge score based on correctly mentioned post – operative risk factors about CAD

Number of factors	Number of respondents	%
0	35	15
1	67	28.8
2	56	24
3	47	20.2
4	21	9.0
5	6	2.6
6	1	0.4
Total	233	100

Table 5. Frequency of mentioned Risk Factors

Risk factors	Surveyed aware, n (%)
High cholesterol level	85 (36.5)
Stress	78 (33.5)
Smoking	76 (32.6)
Food with high fat content	55 (23.6)
High blood pressure	46 (19.7)
Lack of physical activity	44 (18.9)
Family history of heart disease	24 (10.3)
Excess weight	12 (5.2)
Alcohol	9 (3.86)

Table 6. Unadjusted effect of knowledge about post operative risk factors (per unit score) on adherence to medication, smoking, physical activity and diet *

Outcome variables	Odds ratio (OR)	95 % CI for odds ratio
Adherence to medication		
- Conservative	1.024	(0.790; 1,328)
- Less conservative	1.133	(0.928; 1.384)
Smoking	1.480	(1.097; 1.996)
Diet	1.461	(0.942; 2.266)
Physical activity	1.002	(0.825; 1.218)

* Logistic regression

Table 7a. Adjusted* effect of knowledge about post operative risk factors (per unit score) on adherence to medication using conservative definition for adherence to medication

Independent variables	Odds ratio (OR)	95 % CI
Knowledge	1.008	(0.764; 1.330)
Age**	1.025	(0.985; 1.067)
High school	1.131	(0.470; 2.722)
College	0.948	(0.339; 2.652)
Mean beliefs score	1.056	(0.484; 2.304)
Medication affordability	2.548	(1.115; 5.825)

Outcome variable - Adherence to medication (conservative definition)
* Adjusted for confounders such as age, education, mean beliefs score and medication affordability
** Excluded three people aged over 75

Table 7b. Adjusted* effect of knowledge about post operative risk factors (per unit score) on adherence to medication using conservative definition for adherence to medication

Independent variables	Odds ratio (OR)	95 % CI
Knowledge	1.141	(0.852; 1.528)
Age**	1.027	(0.985; 1.070)
High school	1.349	(0.543; 3.351)
College	1.010	(0.354; 2.885)
Mean beliefs score	1.008	(0.450; 2.260)
Medication affordability	3.021	(1.278; 7.141)
Hypertension and Diabetes	9.010	(1.406; 57.754)
Both_knowledge***	0.169	(0.035; 0.803)

Outcome variable - Adherence to medication (conservative definition)
* Adjusted for confounders such as age, education, mean beliefs score and medication affordability
** Excluded three people aged over 75
*** Interaction term (knowledge*Hypertension and Diabetes)

Table 8. Adjusted* effect of knowledge about post operative risk factors (per unit score) on adherence to medication using less conservative definition for adherence to medication

Independent variables	Odds ratio (OR)	95 % CI
Knowledge	1.11	(0.899; 1.370)
Age**	1.010	(0.983; 1.037)
High school	1.072	(0.545; 2.109)
College	0.923	(0.432; 1.971)
Mean beliefs score	1.169	(0.643; 2.125)
Medication affordability	1.703	(0.962; 3.014)

Outcome variable - Adherence to medication (less conservative definition)
* Adjusted for confounders such as age, education, mean beliefs score and medication affordability
** Excluded three people aged over 75

Table 9. Adjusted* effect of knowledge about post operative risk factors (per unit score) on smoking cessation

Independent variables	Odds Ratio	95 % CI
Knowledge	1.532	(1.179; 1.991)
Age	1.046	(1.008; 1.085)
High school	1.549	(0.742; 3.235)
College	2.457	(0.958; 6.300)

Outcome variable – smoking cessation
* Adjusted for confounders such as age and educational status

Table 10. Adjusted* effect of knowledge about post operative risk factors (per unit score) on physical activity status

Independent variables	Odds Ratio	95 % CI
Knowledge	0.993	(0.809; 1.219)
Age	1.004	(0.974; 1.035)
High school	0.862	(0.461; 1.612)
College	0.951	(0.462; 1.959)

Outcome variable – physical activity
* Adjusted for confounders such as age and educational status

Table 11. Adjusted* effect of knowledge about post operative risk factors (per unit score) on diet

Independent variables	Odds Ratio	95 % CI
Knowledge	1.639	(1.007; 2.667)
Age	1.065	(0.985; 1.151)
High school	1.239	(0.262; 5.872)
College	0.454	(0.260; 8.134)

Outcome variable – diet
*Adjusted for confounders such as age and educational status

Appendix 2. Graphs

**Figure 3. Factors associated to diet.**
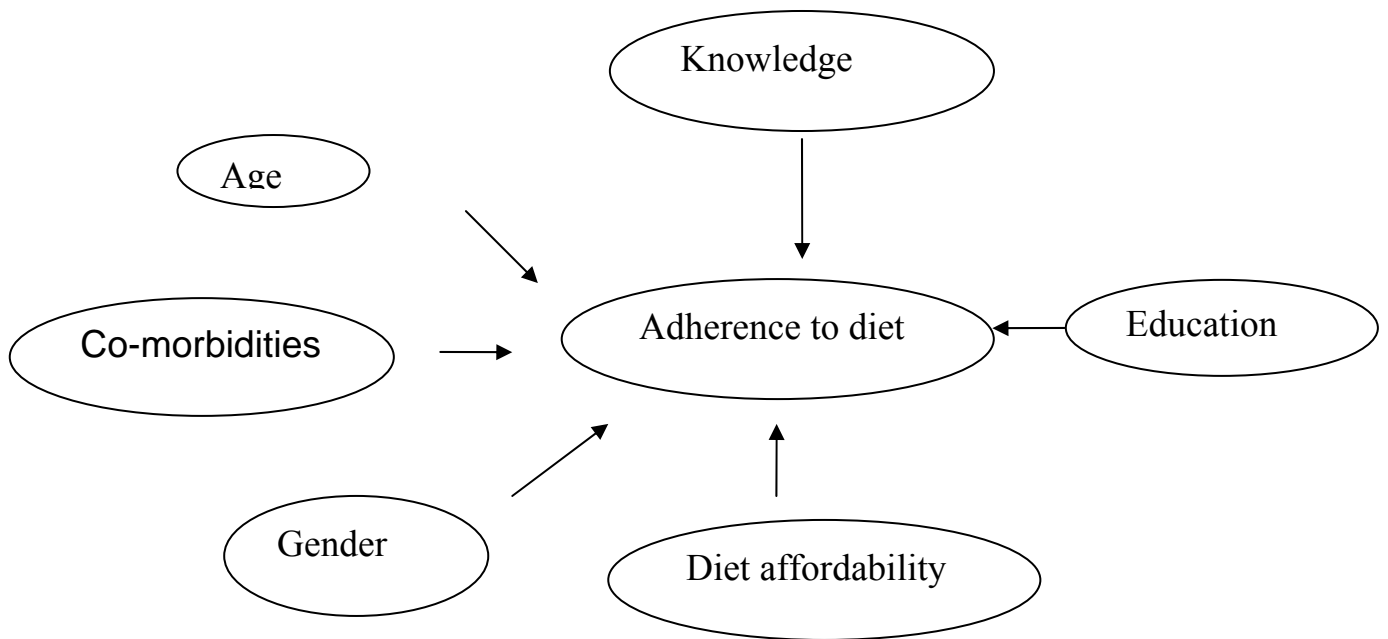
Figure 4. Factors associated to physical activity and smoking cessation.
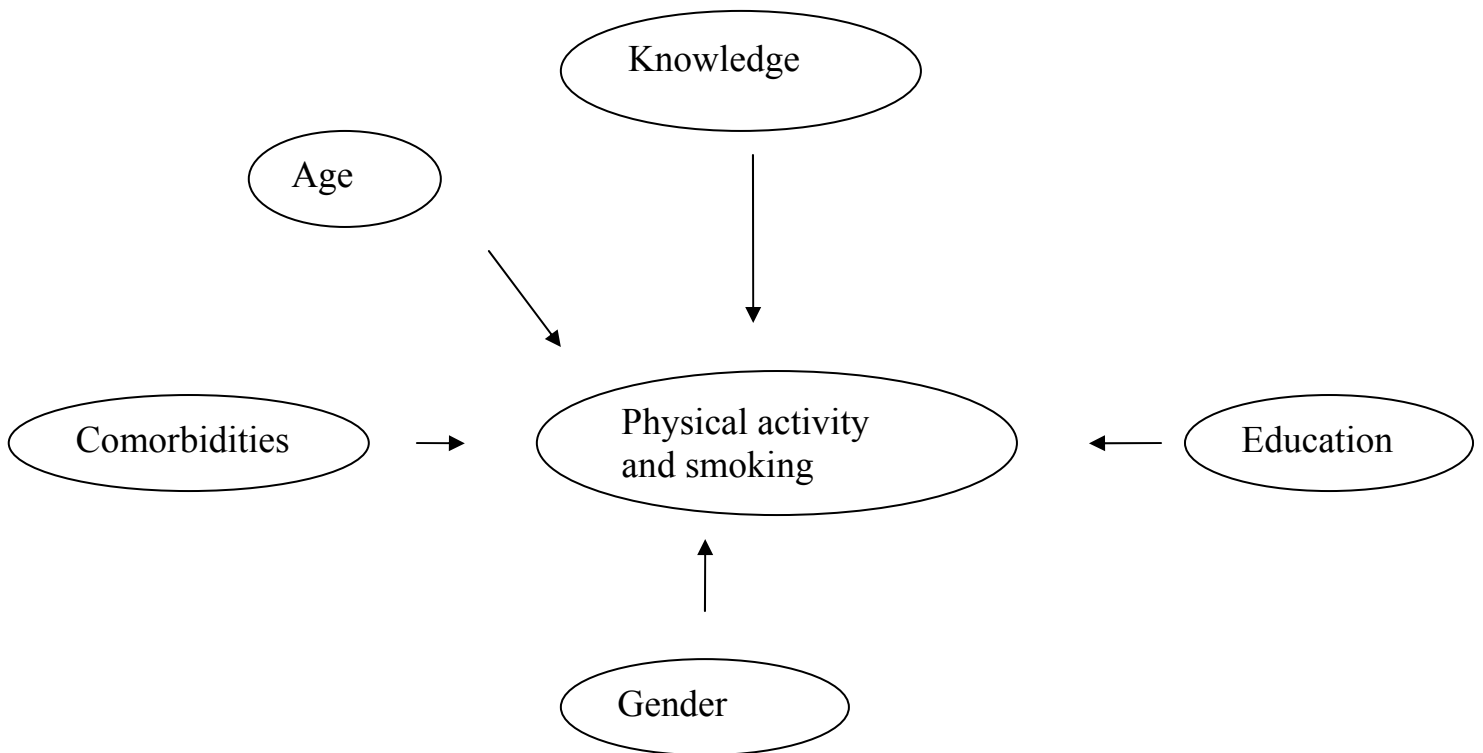
Figure 5. *Result of lowess function*
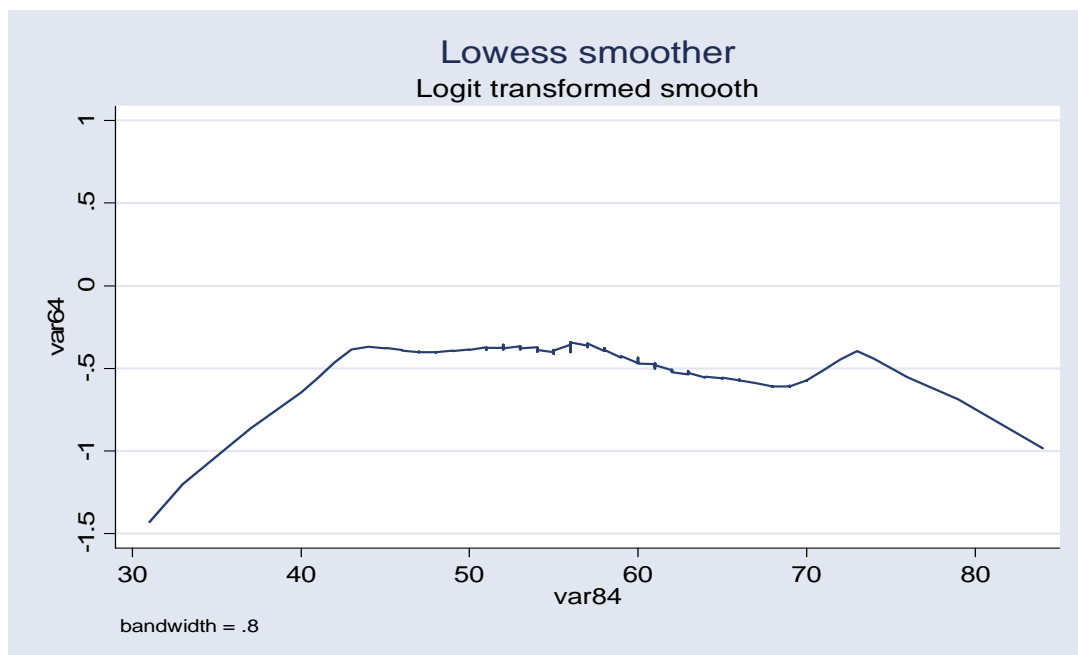
Outcome – Conservative definition of adherence to medication
Independent variable - age

Appendix 3. Questionnaire (English & Armenian)

Questionnaire

ID -----------------

Start time Hour ----- Minutes -----

Date ----- -------- -------- (dd/mm/yyyy)

1. Did you receive brochure about postoperative risk factors? □ 1. Yes

□ 2. No

2. Can you tell me the major causes of heart disease or heart problems? (*DO NOT read the choices to the study participant. Check all that apply.)*

□ 1. Fat in food (including poor diet, too much fat and too much cholesterol).

□ 2. Smoking.

□ 3. Lack of exercise.

□ 4. Excess weight.

□ 5. Elevated blood cholesterol level.

□ 6. High blood pressure.

Others ------------------------------

Next couple of questions is about tobacco use

3. Have you smoked before surgery?

□ 1. Yes

□ 2. No

□ 7. Don't know / Not sure (Go to question 6)

□ 9. Refused (Go to question 6)

4. How often do you smoke now?

□ 1. Every day

□ 2. Some days

□ 3. Not at all (Go to question 6)

□ 7. Don't know/Not sure (Go to question 6)

☐ 9. Refused (Go to question 6)

5. During the past 12 months, have you stopped smoking for one day or longer because you were trying to quit smoking?

☐ 1. Yes

☐ 2. No

Next couple of questions is about physical activity

6. Do you have a job?

☐ 1. Yes

☐ 2. No (Go to question 8)

7. When you are at work, which of the following best describes what you do?

☐ 1. Mostly sitting or standing

☐ 2. Mostly walking

☐ 3. Mostly heavy labors or physically demanding work

☐ 7. Don't know/Not sure

☐ 9. Refused

8. Now, thinking about the moderate activities you do (fill in "when you are not working" if "employed" or self-employed") in a usual week, do you do moderate activities for at least 10 minutes at a time, such as brisk walking, bicycling, gardening, or anything else that causes some increase in breathing or heart rate?

☐ 1. Yes

☐ 2. No (Go to question 11)

☐ 7. Don't know/Not sure (Go to Q11)

☐ 9. Refused (Go to Q11)

9. How many days in a usual week do you do these moderate activities for at least 10 minutes at a time?

_ _ Days per week

☐ 7. Don't know/Not sure (Go to Q11)

☐ 9. Refused (Go to Q11)

10. On days when you do moderate activities for at least 10 minutes at a time, how much total time per day do you spend doing these activities?

__ _ Hours and minutes per day

☐ 7. Don't know/Not sure

☐ 9. Refused

Next couple of questions is about diet

	1=per day	2=Per week	3=Per month	4=Per year	5=Never	7=Don't know/Not sure	9=Refused
11. How often do you drink fruit juices such as orange, grapefruit, or tomato?							
12. Not counting juice, how often do you eat fruit?							
13. How often do you eat green salad?							
14. How often do you eat carrots?							
15. How often do you eat vegetable soup or stew with vegetables							

16. Is it affordable to you to obtain food for diet?

☐ 1. Yes   ☐ 2. No

Next couple of questions is about beliefs towards medication

Statements	1=strongly agree	2= agree	3= neither agree or disagree	4=disagree	5= strongly disagree
Specific Necessity					
17. Your health at present depends on medicines.					
18. Your life would be impossible without medicines.					

19. Without medicines, you would be very ill.					
20. Your health in the future will depend on medicines.					
21. Medicines protect you from becoming worse.					
Specific Concerns					
22. Having to take medicines worries you.					
23. You sometimes worry about long-term effects of medicines.					
24. Medicines are a mystery to you.					
25. Medicines disrupt your life.					
26. You sometimes worry about becoming too dependent on medicines.					
General Harm					
27. Most medicines are addictive.					
28. People who take medicines should stop their treatment for a while every now and again.					
29. Medicines do more harm than good.					
30. All medicines are poisons.					
General Overuse					
31. Doctors use too many medicines.					
32. Doctors place too much					

trust on medicines.					
33. If doctors spent more time with patients, they would prescribe fewer medicines.					
34. Natural remedies are safer than medicines.					

Next questions is about adherence to treatment

35. Do you ever forget to take your medications?

         ☐ 1. Yes   ☐ 2. No

36. Are you careless at times about taking your medications?

         ☐ 1. Yes   ☐ 2. No

37. When you feel better, do you sometimes stop taking your medications?

         ☐ 1. Yes   ☐ 2. No

38. Sometimes if you feel worse when you take your medications, do you stop taking them?

         ☐ 1. Yes   ☐ 2. No

39. Have you ever stopped taking medications because you could not afford it?

         ☐ 1. Yes   ☐ 2. No

40. Co-morbidities   ☐ 1. Yes (specify--)

                               ☐ 2. No

Birth date---------------------------- (dd/mm/yyyy)

Date of surgery ----- -------- -------- (dd/mm/yyyy)

  Gender   ☐ 1. Female

              ☐ 2. Male

                                      End time Hour ----- Minutes -----

Education   ----- 1. Eight grades or less
                  ------2. Secondary school
                  ------3. Technical College
                  ------4. Institute/University

Others (specify)   ---------------------------   THANK YOU!

Սկիզբը՝   Ժամ ----- րոպե ----

Ամսաթիվը՝ --------------------/օր / ամիս / տարի

1. Դուք ստացե՞լ եք բրոշյուր հետվիրահատական ռիսկի գործոնների մասին:

☐ 1. Այո

☐ 2. Ոչ

2. Կարող ե՞ք նշել սրտի հիվանդության հիմնական պատճառները ը   (*մի´ կարդացեք տարբերակները, նշե´ք պատասխանողի կողմից հիշատակված բոլոր պատասխանները*):

☐ 1. Յուղոտ կերակուր (ներառյալ վատ սննդակարգ, չափից ավելի յուղ և խոլեստերին)

☐ 2. Ծխելը

☐ 3. Ֆիզիկական ակտիվության բացակայություն

☐ 4. Ավելորդ քաշ

☐ 5. Խոլեստերինի մակարդակի բարձրացումը արյան մեջ

☐ 6. Արյան բարձր ճնշումը

☐ 7. Չգիտեմ

Այլ   -----------------------------------

Հետևյալ հարցերը վերաբերում են ծխելու սովորությանը

3. Դուք ծխել ե՞ք վիրահատությունից առաջ:

☐ 1. Այո

☐ 2. Ոչ (*անցեք հարց 6 - ին*)

☐ 7. Չգիտեմ / Համոզված չեմ (*անցեք հարց 6 - ին*)

☐ 9. Մերժեց (*անցեք հարց 6 - ին*)

4. Ինչքա ն հաճախ եք ծխում այժմ:

☐ 1. Ամեն օր

☐ 2. Երբեմն

☐ 3. Ընդհանրապես չեմ ծխում (*անցեք հարց 6 - ին*)

☐ 7. Չգիտեմ / Համոզված չեմ (*անցեք հարց 6 - ին*)

☐ 9. Մերժեց (*անցեք հարց 6 - ին*)

5. Վերջին 12 ամսվա ընթացքում թողել եք   ք ծխելը մեկ օր կամ ավելի ծխելու սովորությունից ազատվելու նպատակով:

☐ 1. Այո

☐ 2. Ոչ

Հետևյալ հարցերը վերաբերում են ֆիզիկական ակտիվությանը

6. Դուք աշխատում ե   ք:

☐ 1. Այո

☐ 2. Ոչ (անցեք հարց 8-ին)

7. Ո՞ր վիճակն է ավելի լավ բնութագրում   եզ աշխատանքի վայրում:

☐ 1. Հիմնականում նստած եմ կամ կանգնած

☐ 2. Հիմնականում քայլում եմ

☐ 3. Հիմնականում ֆիզիկական կամ ծանր աշխատանք եմ կատարում

☐ 7. Չգիտեմ / Համոզված չեմ

☐ 9. Մերժեց

8. Սովորաբար մեկ շաբաթվա ընթացքում, Դուք կատարում ե   ք թեթև վարժություններ ամենաքիչը 10 րոպե տևողությամբ ինչպես օրինակ աշխույժ քայլում եք, հեծանիվ եք վարում, այզում եք աշխատում կամ անում եք այնպիսի աշխատանք, որը արագացնում է շնչառությունը և   րտի աշխատանքը (հարցը վերաբերում է և աշխատողներին և ոչ աշխատողներին):

☐ 1. Այո

☐ 2. Ոչ (անցեք հարց 11 - ին)

☐ 7. Չգիտեմ / Համոզված չեմ (անցեք հարց 11 - ին)

☐ 9. Մերժեց (անցեք հարց 11 - ին)

9. Սովորաբար շաբաթվա քանի՞ օրն եք կատարում վերևում նշված 10 րոպե տևողությամբ թեթև վարժությունները:

_ _ Մեկ շաբաթվա օրերի քանակը

☐ 7. Չգիտեմ / Համոզված չեմ (անցեք հարց 11-ին)

☐ 9. Մերժեց (անցեք հարց 11-ին)

10. Ինչքա ն ժամանակ եք տրամադրում նշված 10 րոպե տևողությամբ թեթև վարժություններին մեկ օրվա ընթացքում:

__ _ Ժամերը և րոպեները մեկ օրվա

☐ 7. Չգիտեմ / Համոզված չեմ

☐ 9. Մերժեց

Հետևյալ հարցերը վերաբերում են սննդակարգին

	1=Ամեն օր	2=Շաբա թական	3=Ամս ական	4=Տարեկ ան	5=Երբեք	7=Չգիտեմ / Համոզ ված չեմ	9=Մեր ժեց
11. Ինչքա՞ն հաճախ եք խմում հյութեր ինչպես օրինակ նարնջի, գրեյպֆրուտի կամ պոմիդորի							
12. Բացի հյութերից ինչքա՞ն հաճախ եք օգտագոր ծում մրգեր							
13. Ինչքա ն հաճախ եք ուտում բանջարեղենի սալաթ							
14. ինչքա ն հաճախ եք զազար ուտում							
15. ինչքա ն հաճախ եք ուտում շոգեխաշած միս կամ ձուկ բանջարեղենի հետ (ոչ տապակած)							

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16. Մատչելի է արդյո՞ք այն սննդամթերքը, որն անհրաժեշտ է Ձեզ՝ դիետա պահպանելու համար:

□ 1. Այո □ 2. Ոչ

Հետևյալ հարցերը վերաբերում են դեղորայքի նկատմամբ Ձեր ունեցած հավատին

	1= լիովին համաձայն եմ	2= Համաձայն եմ	3= Ոչ համաձայն եմ, ոչ էլ՝ ոչ	4=համաձայն չեմ	5= լիովին համաձայն չեմ
Հատուկ անհրաժեշտություն					
17. Ձեր առողջությունը ներկայումս կախված է դեղորայքից					
18. Ձեր կյանքն անհնար է առանց դեղորայքի					
19. Դուք շատ հիվանդ կլինեք առանց դեղորայքի					
20. Ձեր առողջությունը ապագայում ես կախված կլինի դեղորայքից					
21. Դեղորայքը պահպանում է Ձեզ և չի թողնում, որ Դուք Ձեզ ավելի վատ զգաք					
Հատուկ վերաբերմունք					
22. Դեղորայքի ընդունումը անհանգստացնում է Ձեզ					
23. Դուք երբեմն անհանգստանում եք դեղորայքի հետևանքների համար					
24. Դեղորայքը առեղծված (անհասկանալի) է Ձեզ համար					
25. Դեղորայքը քայքայում է					

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Ձեր առողջությունը					
26. Դուք երբեմն անհանգստանում եք, որ կարող եք կախվածություն ձեռք բերել դեղորայքի նկատմամբ					
27. Դեղորայքի մեծ մասը կախվածություն է առաջացնում					
28. Մարդիկ ովքեր ընդունում են դեղորայք պետք է դադարեցնեն բուժումը ժամանակ առ ժամանակ					
29. Դեղորայքը ավելի շատ վնասում է քան` օգնում					
30. Բոլոր տեսակի դեղերը թունավոր են					
31. Բժիշկները չափից ավելի շատ են դեղեր կիրառում					
32. Բժիշկները չափից ավելի շատ են հավատ ներշնչում դեղերի նկատմամբ					
33. Բժիշկը ինչքան շատ ժամանակ ծախսի հիվանդի հետ, այնքան քիչ դեղեր կնշանակի					
34.Բնական միջոցները ավելի ապահով են, քան` դեղերը					

Հետևյալ հարցերը դեղորայքի ընդունման մասին են

35. Դուք երբևէ մոռացել ե   ք ընդունել նշանակված դեղորայքը:

☐ 1. Այո   ☐ 2. Ոչ

36. Դուք երբևէ օգտագործել եք ք դեղորայքը անկանոն կերպով

       ☐ 1. Այո   ☐ 2. Ոչ

37. Դուք երբևէ դադրեցրել ե՞ք դեղորայքի ընդունումը քանի որ Ձեր ինքնազգացողությունը լավացել է:

       ☐ 1. Այո   ☐ 2. Ոչ

38. Դուք երբևէ դադրեցրել ե՞ք դեղորայքի ընդունումը քանի որ Ձեր ինքնազգացողությունը վատացել է

       ☐ 1. Այո   ☐ 2. Ոչ

39. Դուք երբևէ դադարեցրել ե ք դեղորայքի ընդունումը քանի որ չեք ունեցել դեղորայք ձեռք բերելու համար անհրաժեշտ գումար:

       ☐ 1. Այո   ☐ 2. Ոչ

40. Ուղեկցող հիվանդություններ՝   ☐ 1. Այո (նշել---------------------------------)
                                    ☐ 2. Ոչ

Ծննդյան տարեթիվը՝ ----------------------------/օր / ամիս / տարի /

Վիրահատման տարեթիվը՝ ---------------------/օր / ամիս / տարի /

   Սեռ   ☐ 1. Կին

            ☐ 2. Տղամարդ

                                Ավարտը՝   ժամ ----- րոպե ----

Կրթությունը ☐ 1. Թերի միջնակարգ

               ☐ 2. Միջնակարգ

               ☐ 3. Միջնակարգ մասնագիտական

               ☐ 4. Բարձրագույն

Այլ ------------------------------

                                    Շնորհակալություն

Appendix 4. Consent Form (English & Armenian)

**American University Of Armenia
Institutional Review Board # 1/Committee On Human Research
College Of Health Sciences Subcommittee For Student Theses**

CONSENT FORM TEMPLATE

Title of Research Project: **Relationship between Patients' Knowledge about Post-Operative Risk Factors after Coronary Artery Bypass Surgery (CABG) and Adherence to Medication and Lifestyle Changes in Armenia**

Explanation of Research Project:

Hello, my name is Aida Nahapetyan. I am second year student of Public Health Department of American University of Armenia. I am performing a study with the purpose to find out about relationship between Patients' Knowledge about Post-Operative Risk Factors after Coronary Artery Bypass Surgery (CABG) and Adherence to Treatment with Prescribed Drugs and Self-Reported Lifestyle Changes at Nork - Marash Medical Center in Yerevan. The selection of the participants was done based on the year, type and place of surgery.

Procedures
Your phone number and name was obtained from the medical records maintained by Nork Marash Medical Center. If you are willing to participate in the study, I will ask you to answer the questions from the questionnaire. The interview will take place only once and will last 10-15 minutes. I can stop the interview if I realize that you are not eligible for the study. Your participation in this study is very important and the information given by you will be useful and valuable for this study.

Risk/Discomfort
There is minimal risk associated with the participation in this study. The participants will not have any problems or inconvenience during the study. Only burden of the study is time (10-15) minutes, which they will spend on answering questions.

Benefits
You will not directly benefit from this study, but the provided information by you will help to identify an association between knowledge and lifestyle change and adherence to the treatment. Further activities may be carried out to increase patients' knowledge about post-operative risk factors in order to have better outcome after CABG.

Confidentiality
Although your name, surname and telephone number were obtained from Nork Marash Medical Center in order to conduct the interview, your name will not be recorded on the questionnaire. You will be assigned a random identification number questionnaire. No one can identify you personal information from the questionnaire. Information will be accessible only to the study investigators. All information provided by you will be kept confidential and will be used only by

Public Health Department at American University of Armenia in performing data analysis.

Valuntariness

The participation of the study is voluntary. It is your decision whether to participate or not. You have the right to stop providing information at any time you wish. You are free not to answer to the questions that you consider inappropriate. They will be no consequences to you in case you decide not to participate in the study.

Whom to contact

The name of student- investigator is Aida Nahapetyan, Master of Public Health student at American University of Armenia. You can ask any question related to the study to the person in charge listed below. You also can ask questions in the future if something is not clear for you. The report of the study will be available in the Public Health Reference Library at American University of Armenia. If you were not treated fairly, conduct

Karine Sahakyan   /phone number/: (3741) 51 25 61

Yelena Amirkhanyan /phone number/: (3741) 51 25 68

                                      /e-mail/:   yamirkh@aua.am

Armenian Version of Study Consent Form

Հայաստանի   մերիկյան համալսարան
Հանրային   րողջապահության Բաժին
Կրթական Վերանայման Խորհուրդ
Համաձայնագիր

Հետազոտության անվանումը

Շունտավորում (անոթների փոփոխություն) անցած հիվանդների հետվիրահատական ռիսկի գործոնների մասին գիտելիքների կապը նրանց կենսակերպի փոփոխման և դեղորայքի ընդունման հետ Հայաստանում։

Հետազոտության բացատրություն

Ողջյուն։ Ես Աիդա Նահապետյանն եմ։ Հայաստանի Ամերիկյան Համալսարանի Հանրային Առողջապահության Բաժնի երկրորդ կուրսի ուսանողուհի եմ։ Ես իրագործում եմ մի հետազոտություն, որի նպատակն է հայտնաբերել շունտավորում (անոթների փոփոխություն) անցած հիվանդների գիտելիքների կապը նրանց կենսակերպի փոփոխման և դեղորայքի ընդունման հետ Երևանի Նորք-Մարաշ Բժշկական Կենտրոնում։ Մասնակիցների ընտրությունը կատարվել է վիրահատության տարվա, տեսակի և վայրի հիման վրա։

Ընթացքը

Ձեր հեռախոսահամարը և անունը ձեռք է բերվել Նորք-Մարաշ Բժշկական Կենտրոնում պահպանվաց գրառումներից։ Եթե Դուք համաձայնվեք մասնակցել այս ուսումնասիրությանը, ես կխնդրեմ Ձեզ պատասխանել մի քանի հարցի։ Հարցազրույցը տեղի կունենա մեկ անգամ և կտնի 10-15 րոպե։ Ես կարող եմ ընդհատել հարցազրույցը այն պահին եթե նկատեմ, որ դուք չեք համապատասխանում ուսումնասիրությանÁ։ Ձեր մասնակցությունը շատ կարևոր է տրամադրած տեղեկությունը կլինի օգտակար ու արժեքավոր։

Վտանգ/ Անհարմարություն

Հարցազրույցը վտանգավոր չէ մասնակիցների համար։ Մասնակիցները չեն ունենա որևէ խնդիր և անհարմարություն ուսումնասիրության ընթացքում։ Միակ ամհարմարությունն այն է, որ նրանք պետք է տրամադրեն 10-15 րոպե հարցազրույցին մասնակցելու համար։

Դուք ուղղակիորեն չեք շահի այս ուսումնասիրությունից։ Բայց Ձեր կողմից տրամադրած տեղեկությունները հնարավորություն կտան ուսումնասիրողներին բացահայտել շունտավորում (անոթների փոփոխություն) անցած հիվանդների գիտելիքների կապը նրանց կենսակերպի փոփոխման և դեղորայքի ընդունման հետ։ Հնարավոր է ծավալվեն հետագա գործողություններ շունտավորման

վիրահատություն անցած հիվանդներին տեղեկացնելու հետվիրահատական ռիսկի գործոնների մասին ավելի լավ արդյունք ունենալու նպատակով:

Գաղտնիություն
Չնայած այն հանգամանքին որ Ձեր անունը, ազգանունը և հառախոսահամարը ձեռք է բերվել Նորք Մարաշ Բժշկական Կենտրոնից, Ձեր անունը չի գրանցվի հարցաթերթիկում: Այն համարակալվում կամ կոդավորվում է: Ձեր անձը հնարավոր չի լինի հաստատել հարցաթերթիկի տվյալների հիման վրա: Տեղեկատվությունը հասանելի կլինի միայն հետազոտողներին: Ձեր կողմից տրամադրած տեղեկությունները կմնան գաղտնի և կօգտագործվեն Հայաստանի Ամերիկյան Համալսարանի Հանրային Առողջապահության Բաժնի կողմից միայն ուսումնասիրության վերջնական վերլուծության համար:

Մասնակցությունից հրաժարվելու իրավունք
Ձեր մասնակցությունը այս հետազոտությանը կամավոր է: Ձեր իրավունքն է մասնակցել հետազոտությանը կամ ոչ: Դուք իրավունք ունեք հրաժարվել մասնակցությունից հետազոտության ցանկացած պահի և խուսափել պատասխանել ցանկացած հարցի: Ոչ մի բացասական հետևանք չի լինի, եթե Դուք հրաժարվեք մասնակցել հետազոտությանը:

Հետազոտողի տվյալները
Հետազոտողի անունը Աիդա Նահապետյան է, Հայաստանի Ամերիկյան Համալսարանի Հանրային Առողջապահության Բաժնի ուսանողուհի: Դուք կարող եք դիմել նրան հետազոտությանը վերաբերող ցանկացած հարցով: Հետազոտողի հեռախոսահամարներն են` 27 24 30, (091) 53 00 54:
Բացի այդ, եթե Ձեզ անհրաժեշտ է լրացուցիչ ինֆորմացիա, ապա կարող եք դիմել

Ելենա Ամիրխանյանին` (3741) 51 25 68, ՀԱՀ

Կարինե Սահակյանին` (3741) 51 25 61, ՀԱՀ