ORIGINAL RESEARCH

The influence of educational nursing intervention on the eating habits and anthropometric values of people who have undergone coronary surgery

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ABSTRACT

Objective: Educational nursing intervention is a strategy that can be useful for changing behaviours in a person's health. Hospitalisation for coronary surgery is a valuable opportunity for the nurse to implement the knowledge which aims to promote healthy behaviours and secondarily, prevent coronary and cardiovascular disease, as these continue to be the main causes of death worldwide. The purpose of this study is to evaluate the influence of educational nursing intervention in the promotion of a healthy diet and in the anthropometric values (body mass index and waist perimeter) of people who have undergone coronary surgery.
Methods: A quantitative and quasi-experimental study was conducted on a control group (20 participants in each group). The experimental group was submitted to a personalised structured educational intervention during hospitalisation, in the nursing follow-up visit (two to three weeks after surgery) and over the phone (two months after surgery). Each group went through two evaluations: the first before the surgery, and the second three months after the surgery. The instruments used to collect data included: the sociodemographic and clinical characterisation questionnaire and the Eating Habits Scale. Non-parametric tests were used.
Results: The findings showed that 77.5% of the participants were male and 22.5% female. The participants' average age was 67.35 ± 8.151. Results showed a significant improvement in the eating habits of both groups, with higher relevance in the experimental group and a reduction of the body mass index and waist perimeter exclusively in the experimental group.
Conclusions: Regarding people who have undergone coronary surgery, personalised structured educational nursing intervention is a useful tool in obtaining health benefits and in secondary prevention of cardiovascular disease. More extensive and comprehensive studies are recommended to verify the results and enhance their success.

Key Words: Educational intervention, Nursing, Cardiovascular diseases, Coronary surgery, Health behaviours, Secondary prevention, Eating habits, Anthropometric values

1. INTRODUCTION

Cardiovascular diseases are an important, integral part of the so-called chronic non-communicable diseases (NCDs). These are multifactorial diseases which develop throughout life and are characteristically long lasting. The World Health Organization (WHO) has given accentuated importance to the control and prevention of this type of diseases due to the global burden they represent in the world. The four biggest

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NCDs (cardiovascular diseases, cancer, chronic obstructive pulmonary disease and diabetes) are responsible for 77% of all diseases and 86% of the deaths in Europe, contributing to most of the preventable diseases and deaths in the European region of the WHO.[1]

This reality is reinforced by the data updated in 2014 which shows that cardiovascular disease, more specifically coronary heart disease and Cerebral Vascular Accident (CVA), continues to cause more deaths in Europe than any other condition.[2] Furthermore, the WHO's action plan for the control and prevention of NCDs identifies the following as common risk factors for the four most important NCDs: tobacco use, harmful alcohol consumption, physical inactivity, and an inadequate diet.[1] All these factors are simultaneously causes of coronary disease.[3]

As such, to control and prevent these diseases, it is essential to invest in the people's literacy and education to adopt healthy lifestyles, along with the reinforcement of secondary and tertiary prevention measures, which will allow the achievement of more health gains in life quality and in productivity.[4] The current Portuguese National Health Plan references the WHO by stating that: the individual health path is not constant, it has specific needs and particularly important moments – critical periods – which, in the way they occur, positively or negatively have a direct influence on the following phases of life. Intervention at these moments – windows of opportunity – promotes and protects health and may have high relevance mid and long term.[5]

1.1 Eating habits

Eating behaviour or eating pattern is one of the main health behaviours that determine the occurrence of chronic diseases, including cardiovascular. Besides primary prevention, the protective role of the diet in secondary prevention is now starting to be demonstrated. The Ontarget and Transcend studies, referred to by Perdigão (2013) showed a 35% reduction in the risk of cardiovascular death, a 14% reduction in the risk of new acute coronary syndromes, a 28% reduction in the risk of congestive heart failure, and a 19% reduction in the risk of CVA. Perdigão mentions that this scientific evidence, seen for the first time in such a vast high risk population, must alert healthcare professionals who work in prevention to encourage individuals to adhere to a steady change in their lifestyle habits, educating them that it is never too late to acquire healthy eating habits.[6]

Also Nikolic (2012) refers that the results of his study indicated the substitution of saturated fats, unsaturated fatty acids and carbohydrates must be an important part of all nutrition strategies in secondary cardiovascular prevention. The author also states that the responsibility for an adequate diet in secondary prevention of coronary disease must be shared among the individual, healthcare services, family and society.[7]

According to the American Heart Association guidelines, the dietary recommendations in cardiovascular prevention can be summarised as follows: reduce caloric intake, namely by not consuming sugar and sweet or sweetened drinks, so as to maintain the recommended weight; consume varied fruits and vegetables, dried fruits, soya products, low fat products, cereals, wholegrain pastas and breads; eat fish at least twice a week; consume oils and margarines with a low content of saturated fats and high in omega 3 fatty acids; reduce the intake of saturated and trans saturated fats such as red meats, sausages and cured meats, processed meats and whole milk; reduce the consumption of alcohol to two standard drinks a day for men and one for women; consume less than 6 grams of salt per day.[6]

Within the context of coronary disease and coronary surgery, a study done in Poland shows that dietary education for people who have undergone coronary surgery is essential. This study concludes that these people have an unhealthy diet and do not follow the given recommendations, making it necessary to carry out systematic nutritional education programs, aimed at these groups.[8]

1.2 Framework

The surgical and post-surgical context for coronary surgery, due to its multiple factors, can be considered a critical period but at the same time a window of opportunity in which to carry out educational interventions to promote healthy behaviours. Such as Smeltzer et al. (2010) state, all nursing contact made with the individual, ill or not, should be considered a moment of health education. Whether or not a person is willing to make a behavioural change, nurses have the responsibility of providing the information which will enable him or her to make a choice.[9]

Surgery improves blood flow in the heart, but does not prevent coronary disease from evolving. To reduce this risk, it is important that there be a change in lifestyle.[10] With this in mind, various studies on the perspective and needs of the persons submitted for coronary surgery lead us to a clear need to invest in personalised health education.[11–13] Unhealthy eating habits can be the cause of these diseases and where the nurse can intervene to promote change.

In the context in which the study was conducted, the nursing team and other multi-professional teams occasionally promote health education but without a personalised, structured and systematic plan. This is an autonomous nursing

intervention which needs to be improved.

2. METHODS

A quantitative approach was used as the investigation methodology. The objective of the study was: to evaluate the influence of educational nursing intervention on the eating habits and the anthropometric values of a person who has undergone coronary surgery. The type of study is quasi-experimental educational intervention study, with pre and post assessing of two groups of participants: the experimental group (EG) and the control group (CG).

The participants chosen for this study were patients submitted to coronary surgery at Centro de Cirurgia Cardiotorácica e Transplantação de Órgãos Torácicos do Centro Hospitalar e Universitário de Coimbra (CHUC-HUC). As inclusion criteria for this study it was determined that all participants had to be adults, conscientious and oriented, would accept to be part of the study, and had the ability to read and answer in writing. All the participants were submitted to the same type of surgery, specifically, coronary artery bypass grafting (CABG) with extracorporeal circulation. Some individuals were concomitantly submitted to an aortic valve replacement. The method for sample collection was of the non-probable accidental sample, having the elements been selected for convenience.

The data collection instrument included a sociodemographic profile, the clinical characteristics, the anthropometric values and a scale in the form of a questionnaire, validated for the Portuguese population: the Eating Habits Scale (EHS).[14] This scale allows the evaluation of the Portuguese population's eating habits. It is an instrument of 40 items which refer to eating habits in the previous week. Of these 40 items, three were excluded (numbers 34, 35 and 36) for pertaining to the consumption of liquids. This exclusion was justified by the restriction of liquids that the participants are subject to after coronary surgery. This restriction was associated to the prevention of surgery-related complications. The implemented scale was made up of 37 items. It develops in Likert-type answers which vary from 1 to 5 points. The scale total is the sum of the points divided by the number of items. It is considered that the higher the average score of all items, the more adequate the eating habits are.

The BMI is calculated using the formula Weight/Height^2 and represented by the units kg/m^2. The weight categories based on BMI are designated according to Table 1.

The WC is evaluated in centimetres and following the guidelines of the Direção Geral de Saúde (DGS).[15] The risk of metabolic complications based on the WC are designated according to Table 2.

Table 1. BMI and weight categories[15]

Designation	BMI	Weight class
		Low weight class
Severe underweight	< 16.00	III
Average underweight	16.00-16.99	II
Moderate underweight	17.00-18.49	I
Normal	18.50-24.99	Normal weight
Overweight	25.00-29.99	Pre-obesity
		Obesity class
Obesity	30.00-34.99	I
Obesity	35.00-39.99	II
Obesity	≥ 40.00	III

Table 2. Risk of metabolic complications and WC[15]

Designation	Cut-off point	Risk of metabolic complications
WC	> 94 cm (Man); 80 cm (Woman)	High
WC	> 102 cm (Man); 88 cm (Woman)	Very high

2.1 Intervention plan

This intervention was based on the Health Promotion Model of Nola Pender,[16] which was developed specifically for nursing with the aim of promoting healthy behaviours.

The structured and personalized intervention was conducted in post-operatory period following coronary surgery, during hospitalization, in the follow up appointment and later by phone as depicted in Figure 1. There were at least five in-

terventions per person, averaging 45 minutes each. During hospitalization the first intervention occurred on the third day of post-operatory (PO3), the second was on the fourth day (PO4), and the third was on the fifth day (PO5), on average. This timing was considered the most effective due to the patient being debilitated before the third day after surgery. The interventions were carried out during regular contact with the patient, namely, at the time of the follow up appointment. The remaining moments of intervention were set taking into consideration the time constraints in order to conclude the study.

The interventions were structured and personalized for each person of the EG group, to address the least healthy habits identified in the pre-operatory moment when the first data collection occurred. Each person's intervention plan also benefitted from the nurse's first interactions with the individual and his or her family. Each intervention is detailed in Table 3.

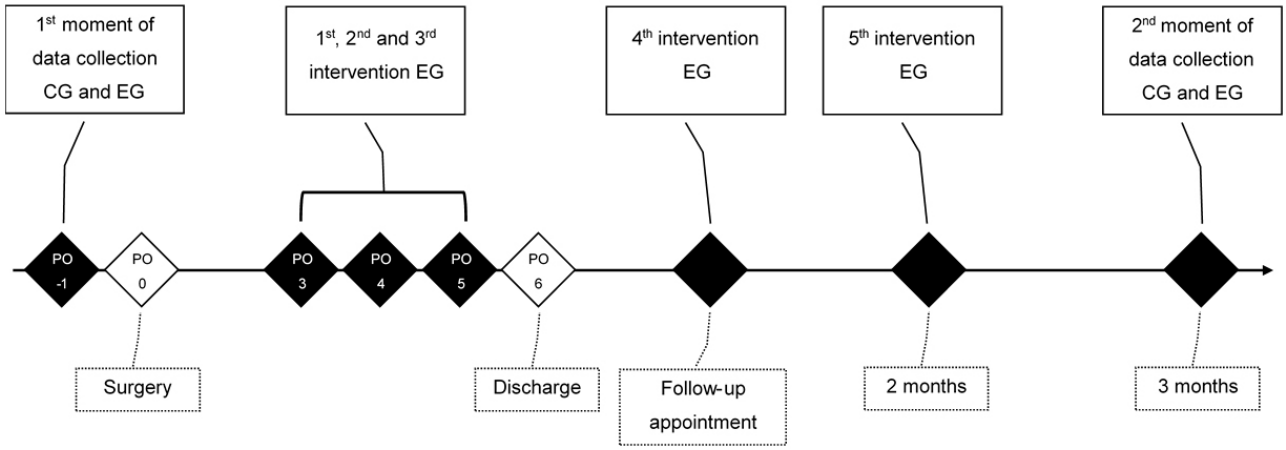

Figure 1. Educational intervention schematic representation

Table 3. Personalised structured educational intervention plan

Moments	Interventions
1st Intervention PO3	Get to know the person, his/her prior behavioural habits and personal context (physical, psychological, biological and sociocultural). Describe coronary and cardiovascular disease and chronical disease. Explain the evolution of atherosclerotic disease. Present the causes of coronary disease and more specifically the risk behaviours: inadequate eating habits, low physical activity, smoking and excessive alcohol consumption. Present the benefits gained by changing to healthier behaviours. Deliver documentation about coronary disease.
2nd Intervention PO4	Clarify any doubts related to the topics discussed in the previous intervention. Explain the least healthy behaviours. Approach the Mediterranean diet and its benefits. Ascertain the possible interpersonal influences and barriers that can influence the behavioural change. Deliver documentation about eating habits.
3rd Intervention PO5	Clarify any doubts related to the topics discussed in the previous interventions. Discuss the least healthy behaviours. Help the person set a plan of action with objectives in order to establish healthy habits (dietary changes, weight loss objective).
4th Intervention Follow up appointment (after two to three weeks)	Clarify any doubts related to the topics discussed in the previous interventions. Discuss and reinforce the teachings concerning least healthy behaviours. Explain the benefits gained by adopting healthy behaviours. Monitor the changes in behaviour, discover possible barriers to overcome and positively reinforce the objectives already reached.
5th Intervention Phone call (after 2 months)	Clarify any doubts related to the topics discussed in the previous interventions. Discuss and reinforce the teachings concerning least healthy behaviours. Explain then benefits gained by adopting healthy behaviours. Monitor the changes in behaviour and discover possible barriers to overcome and positively reinforce the objectives already reached.

The teachings were based on the recommendations of OMS, DGS and on the principles of the Mediterranean diet. Some highlights of these recommendations' highlights are the ingestion of fruits, vegetables, cereals, fish unsaturated fats, such as olive oil, a moderate consumption of alcohol such as wine during mealtimes, low intake of red meat, dairy products and saturated fats.[17] The educational intervention versed also on topics like the consumption of salt, sugar and caffeine.

Several strategies were used to promote behavioural change, such as auto monitoring, the setting of objectives, the support of family members, and useful information transmitted to the person both verbally and on documentation given. These strategies are aligned with the importance of a commitment to a plan of action and the perceived benefits of action detailed in the Health Promotion Model of Nola Pender.

Whenever possible, one or more family members or a trusted one were present whenever possible in the educational interventions because, as Nola Pender refers: families, peers, and health care providers are important sources of interpersonal influence that can increase or decrease commitment to and engagement in health promoting behaviour.[16]

2.2 Statistical analysis

The data obtained was inserted into a Statistical Package for Social Sciences (SPSS) file, version 23. Non-parametric tests were used for statistical analysis. A $p < .05$ value was considered statistically meaningful. The inferential analysis of the collected data was made through Mann-Whitney's U test (independent samples) and Wilcoxon's test (paired samples). The analysis of the differences between the groups, as well as within the same group was made at the first moment (T0) and the second moment (T1).

2.3 Ethical considerations

Authorisation was obtained from the Administration Council/ Ethics Commission of the CHUC-HUC (reference CHUC-073-15, with registration number 8910PCA dated 4/11/2015). The participants were clarified on the conditions and objectives of the research, and the informed consent was signed individually and of free will.

3. RESULTS

As shown in Table 4 there were 40 participants in this study, 20 of whom belonged to the CG and the other 20 to the EG. The average age of the sample was 67.35 years old.

This sample is mostly composed of male participants (31 individuals), who make up 77.5% of the sample. Regarding marital status, the majority of the participants were married or lived in a non-marital partnership (70%). As for academic level, data shows that most part of the participants (52.5%) only completed primary school. In relation to their professional situation, 75% of the participants are currently retired (see Table 5).

Table 4. Statistical summary of the sample's ages

Groups	n	Med.	Mean	SD	Min.	Max.
Control	20	68	66.25	9.602	49	79
Experimental	20	68	68.45	6.452	57	78
Total	40	68	67.35	8.151	49	79

Regarding personal health history 77.5% of the participants have dyslipidemia, 82.5% suffer from hypertension, 40% are diabetic, 7.5% have already had a CVA episode and 27.5% have had an AMI episode. The presence of saphenectomy for the execution of surgical bypass was verified in 60% of the participants. Of the sample, 27.5% revealed complications, most of which taken care of by the date of discharge (see Table 6). The participants with severe post operatory complications were not included in the study. The CG individuals' complications were: transitory ischemic accident, sternotomy infection and pneumonia. The EG complications were saphenectomy infection, complete auricular-ventricular block, acute pulmonary oedema and permanent hoarseness (all taken care of by the date of discharge, with the exception of permanent hoarseness). As for the days of hospitalisation, the average number of days admitted was six. Nine elements of the CG and twelve elements of the EG were submitted to aortic valve replacement.

3.1 Eating habits

Eating habits were evaluated via the EHS. In this study the scale presents psychometric properties which indicate a reasonable internal consistency,[18] with a Cronbach alpha of 0.79 at the first moment of evaluation and 0.762 at the second moment. These values are in accordance with the internal consistency found by the authors of the scale (Cronbach alpha of 0.816).[14]

When analysing the scale's global score results, there's an improvement in both the CG and EG from the first moment to the second moment, as shown in Table 7.

Table 5. Sample distribution based on sociodemographic characteristics

Sociodemographic characteristics		Control G.		Experimental G.		Total	
		n	%	n	%	N	%
Gender	Masculine	15	75	16	80	31	77.5
	Feminine	5	25	4	20	9	22.5
Total		20	100	20	100	40	100
Marital Status	Single	1	5	0	0	1	2.5
	Married/Non-marital partnership	11	55	17	85	28	70.0
	Divorced/Estranged	5	25	1	5	6	15.0
	Widowed	3	15	2	10	5	12.5
Total		20	100	20	100	40	100
Academic level	Primary school	9	45	12	60	21	52.5
	Middle school	5	25	0	0	5	12.5
	Junior high school	0	0	2	10	2	5.0
	High school/Vocational education	4	20	2	10	6	15.0
	University education	2	10	4	20	6	15.0
Total		20	100	20	100	40	100
Professional Situation	Self employed	2	10	2	10	4	10.0
	Employee	1	5	3	15	4	10.0
	Retired	15	75	15	75	30	75.0
	Unemployed	2	10	0	0	2	5.0
Total		20	100	20	100	40	100

Table 6. Sample distribution based on clinical characteristics

Clinical characteristics	Control G.		Experimental G.		Total	
	n	%	n	%	N	%
Dyslipidemia	16	80	15	75	31	77.5
Hypertension	16	80	17	85	33	82.5
Diabetes	5	25	11	55	16	40.0
CVA	1	5	2	10	3	7.5
Acute myocardial infarction (AMI)	7	35	4	20	11	27.5
Saphenectomy	12	60	12	60	24	60
Complications	4	20	7	35	11	27.5

Table 7. Statistical summary of the sample according to the EHS, at both moments of evaluation

EHS	Control G.						Experimental G.					
	n	Med.	Mean	SD	Min.	Max.	n	Med.	Mean	SD	Min.	Max.
T0	20	3.689	3.676	0.423	2.676	4.486	20	3.743	3.815	0.263	3.514	4.378
T1	20	3.878	3.895	0.329	3.189	4.324	20	4.081	4.119	0.203	3.784	4.514

3.2 Anthropometric evaluation

In Table 8, an increase in the average value of the CG's BMI from the first to the second moment of evaluation is verified, with the same tendency occurring in relation to the median. In turn, the EG presents a decrease in the average value of the BMI, as well as the value of the median from the first to the second moment.

On analysing the BMI ranking by categories of weight (see Table 9) an improvement can be seen in regards to the EG and a worsening in the CG in the first three weight categories (normal, overweight and obesity type I). Despite this, the differences are subtle when all BMI categories are observed.

Table 8. Statistical summary of the sample's BMI at both moments of evaluation

BMI	Control G.						Experimental G.					
	n	Med.	Mean	SD	Min.	Max.	n	Med.	Mean	SD	Min.	Max.
T0	20	27.625	27.217	4.787	19.77	40.48	20	28.135	28.872	3.659	23.92	39.10
T1	20	27.785	27.824	4.148	19.96	37.95	20	27.550	28.486	4.101	24.77	41.52

The CG shows average and median values that do not differ from the first to the second moment. In the EG, the average and median values show a decrease from the first to the second moment (see Table 10).

When comparing the groups in relation to the metabolic risk categories associated to WC, the differences are subtle. The CG has one more individual in the very high risk category and one less in the high risk category when comparing the first moment to the second moment. Conversely, there is an improvement in the EG, since there are two less participants classified as being at very high risk in the second moment of evaluation (see Table 11).

Table 9. Sample distribution according to the BMI weight categories

BMI weight categories		Control G.		Experimental G.		Total	
		n	%	n	%	N	%
T0	Normal	5	25	2	10	7	17.5
	Overweight	11	55	12	60	23	57.5
	Obesity I	3	15	5	25	8	20.0
	Obesity II	0	0	1	5	1	2.5
	Obesity III	1	5	0	0	1	2.5
Total		20	100	20	100	40	100
T1	Normal	4	20	2	10	6	15.0
	Overweight	11	55	13	65	24	60.0
	Obesity I	4	20	4	20	8	20.0
	Obesity II	1	5	0	0	1	2.5
	Obesity III	0	0	1	5	1	2.5
Total		20	100	20	100	40	100

Table 10. Statistical summary of the sample's WC at both moments of evaluation

WC	Control G.						Experimental G.					
	n	Med.	Mean	SD	Min.	Max.	n	Med.	Mean	SD	Min.	Max.
T0	20	97.00	99.35	12.145	78	121	20	102.50	103.00	11.567	84	132
T1	20	97.00	99.35	10.474	80	123	20	98.50	101.30	10.229	86	132

3.3 Inferential analysis

The inferential analysis shows that the differences between the CG and EG regarding the EHS are not statistically significant in the first moment (U = -1.097; p = .279). Despite this, in the second moment the differences are already statistically significant (U = -2.017; p = .044). These results reveal the groups' homogeneity concerning eating habits in the first moment.

Observing the evolution regarding the EHS in each group at both moments, one can see a significant increase of the EHS values in the CG from the first moment (Med. = 3.689) to the second moment (Med. = 3.878) (Z = -2.638; p = .006). There was also a significant increase of the EHS values in the EG from the first moment (Med. = 3.743) to the second moment (Med. = 4.081) (Z = -3.638; p = .000) (see Table 12).

By jointly analysing the differences between the groups and within each group, educational nursing intervention seems to make a positive contribution to the eating habits of the individuals subjected to it. This was demonstrated by the highest significance in the EG.

Table 11. Sample distribution according to metabolic risk associated to WC

Metabolic risk associated to WC		Control G.		Experimental G.		Total	
		n	%	n	%	N	%
T0	Not at high risk	4	20	2	10	6	15.0
	High risk	6	30	4	20	10	25.0
	Very high risk	10	50	14	70	24	60.0
	Total	20	100	20	100	40	100
T1	Not at high risk	4	20	3	15	7	17.5
	High risk	5	25	5	25	10	25.0
	Very high risk	11	55	12	60	23	57.5
	Total	20	100	20	100	40	100

Table 12. Main results of the EHS

Variable		T0 Med.	T1 Med.	Improvement	Statistical Significance			
					Between groups T0	Between groups T1	In CG (T0_T1)	In EG (T0_T1)
EHS (points)	CG	3.689	3.878	Yes	No p = .279	Yes p = .044	Yes p = .006	Yes p = .000
	CEG	3.743	4.081	Yes				

On observing Table 13 regarding BMI, it is seen that the difference between the two groups both in the first moment and in the second are not statistically relevant.

On observing the evolution of BMI within each group at both moments, there are also no statistically significant differences within the groups from the first to the second moment. In the CG there is no significant improvement (Z = -1.176; p = .251) from the first moment (Med. = 27.625) to the second moment (Med. = 27.824), on the contrary, the median value increases. In the EG, although there is an improvement (decrease) from the first moment (Med. = 28.135) to the second moment (Med. = 27.550), the difference is not statistically significant (Z = -1.538; p = .135).

Table 13. Main results of BMI

Variable		T0 Med.	T1 Med.	Improvement	Statistical Significance			
					Between groups T0	Between groups T1	In CG (T0_T1)	In EG (T0_T1)
BMI (kg/m^2)	CG	27.625	27.785	No	No p = .314	No p = .899	No p = .251	No p = .135
	EG	28.135	27.550	Yes				

Regarding the WC values, Table 14 shows that the differences between the two groups both in the first and the second moments are not statistically significant. Now observing the evolution of WC within each group at both moments, there are also no statistically significant differences within the groups from the first to the second moment. The median values in the CG (97.00) are maintained from the first to the second moment, not revealing significant differences (Z = -0.240; p = 0.828). In the EG there is an improvement (decrease) of the WC values from the first moment (Med. = 102.50) to the second moment (Med. = 98.50), despite the differences not being significant (Z = -1.771; p = 0.079).

Table 14. Main results of WC

Variable		T0 Med.	T1 Med.	Improvement	Statistical Significance			
					Between groups T0	Between groups T1	In CG (T0_T1)	In EG (T0_T1)
WC (cm)	CG	97.00	97.00	The same	No p = .337	No p = 0.507	No p = 0.828	No p = .079
	EG	102.50	98.50	Yes				

The decrease of anthropometric values is not statistically relevant. In spite of this, there is a higher tendency for a decrease in the BMI and WC values in the EG than the CG. This is supported by the fact that the EG is the only one to present a decrease in these values.

4. DISCUSSION

The results analysis indicates that there is a positive effect of educational nursing intervention on the improvement of the participants' eating habits, since there are significant differences between the groups in the second moment, as well as a higher statistical significance in the improvement of eating habits in the EG between both moments. This higher statistical significance demonstrates an important clinical improvement.

Many studies confirm the positive role of educational intervention. An example is the Italian study with a sample of 133 patients with coronary disease assessed 12 months after discharge. This study showed the important role of an individualised educational intervention focused on dietary habits as an effective complement to a more global program, specifically in the reduction of calorie intake.[19] Furthermore, the revised literature of Cole, Smith, Hart and Cupples (2011) on the effect of interventions that have the objective of changing eating habits for secondary prevention of coronary disease, despite the heterogeneity between trials, suggests improvements in this modifiable risk factor as well as in the decrease of mortality and fatal heart episodes.[20]

Lin et al. (2009) present a similar research with a sample of 73 participants, developed in Taiwan with the same participant typology. They state that at three months, after hospital discharge, there is a significant difference ($p < .001$) between the EG and the CG in the eating habits. However, they also state that both groups revealed significant improvements when comparing them prior to surgery and three months later. The results are similar to the ones presented in this research, thus supporting the results attained in this study.[21] Equally, an Australian study (n = 275) conducted by psychologists and nurses with the aim of improving various behaviours, namely in eating habits of people with AMI, CABG and percutaneous transluminal coronary angioplasty (PTCA) demonstrated significant improvements in the dietary pattern of the EG in comparison to the CG in the four-month ($p < .019$) and twelve-month ($p < .035$) post-program evaluations. This study resorted to various strategies during an eight-week outpatient program with a weekly hour-and-a half-session each.[22]

In the study by Safabakhsh et al. (2016) involving eighty participants who had undergone coronary surgery and were submitted to a health promotion program, there were positive results in the diet variable at three-month follow up. The progress of the EG and the difference between the groups after intervention are significant. In this case, the CG did not reveal an improvement in the diet variable ($p < .265$).[23] In addition, Sundin et al. (2003) report positive results in the eating habits of 132 individuals submitted to behavioural rehabilitation programs when compared to those who only receive standard care, in their study conducted on patients suffering from coronary diseases (AMI, CABG, PTCA) with a twelve-month follow up.[24]

The result of this study seem to align with the result of the referenced literature, even having the CG sometimes showing evidence of improvement and at other times showing none. It should be noted that the group subjected to intervention shows a significant behavioural improvement in all referenced studies.

In terms of anthropometric values, the individuals subjected to educational nursing intervention make up the only group that revealed improvements, despite these not being significant. From this analysis there seems to be a positive contribution of educational intervention in the decrease of the individuals' BMI and WC. This demonstrates a relevant clinical significance.

The study of Lin et al. (2009) also did not find significant differences between the EG and CG in what refers to BMI ($p < .09$), despite referring that there was a positive evolution in time (evolution within each group). The study show similar results to this research, since it assumes that there is no significant improvement in BMI, at a three-month post-surgery assessment.[21] Equally, the study of Sundin et al. (2003) conducted on patients with coronary diseases had similar BMI results in participants subjected to behavioural rehabilitation programs and those who only receive standard care.[24]

Murphy et al. (2013) in their study also found slight, but still important changes in WC in the EG at four months ($p < .073$) and 12 months ($p < .143$) follow up, despite not significant, exclusively in this group. It is important to point out that even in the long-term follow-up (12 months) no considerable improvements were verified.[22]

Murphy et al. (2011) verified that patients who suffered an acute cardiac episode were not following the recommendations in what refers to WC reduction ($p < .417$) in an assessment made six weeks after hospital discharge. These patients were not subjected to any kind of educational program.[25]

Differing to the results of this research, the study by Manzoni et al. (2011) with a sample of 176 participants, despite its

short duration (four weeks), found significant decrease of weight and BMI ($p < .001$). These results may be related to the fact that they were inpatients (higher variable control).[26] Also Ravazi et al. (2014) on a three, twelve and twenty four-month follow up study with 580 participants, observed significant improvements in the decrease of BMI ($p < .001$ in all the evaluation moments), when evaluating the results of two lifestyle change programs (based on changes in eating habits, physical exercise and stress, amongst other things).[27]

In the same way, the study previously referenced, conducted by Luisi et al. (2015) demonstrated the important role of individualised educational intervention in the reduction of BMI.[19] Reveles (2015) also presented results showing a significant decrease of BMI ($p < .012$) and WC ($p < .027$), in the Portuguese study of 24 individuals with acute coronary syndrome who were followed-up on for six months in an educational nursing intervention program, when compared to the group not submitted to the program.[28]

The studies presented above show a tendency for significance in the decrease of the anthropometric values, or at least for an improvement of those parameters, which is in accordance with the results that emerge from this study.

Limitations of the study

The main limitations of the study are the small size of the sample, its non-probabilistic nature and the limitation of three months to assess the intervention. Other limitations can be associated to the disparities of the clinical variables, such as, a higher number of participants with diabetes and complications in the EG. Nevertheless, the influence of these variables may not be so significant, considering the homogeneity of other characteristics like the sociodemographic and clinical variables and the dependent variables in the first moment of evaluation in both groups.

5. Conclusion

The main results of this research show that personalised, structured educational nursing intervention is an advisable approach in the improvement of eating behaviours and the decrease of BMI and WC of a person submitted to coronary surgery, with gains in their health and in secondary prevention of coronary and cardiovascular diseases and NCDs.

Further interventions and research are recommended, namely:

- Implementation of pre-operatory follow-up programs with the objective of an earlier change in eating habits;
- Implementation of longer post-operatory follow-up programs (at hospitals and in coordination with primary health care);
- Implementation of educational health programs more focused on collaboration with family and social networks.

As such, educational interventions should cover more and longer periods, crucial to the promotion of health, and as early as possible to potentiate their success.

Conflicts of Interest Disclosure

The authors declare that there is no conflict of interest.

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