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Original Article

The influence of treatment modality on illness perception and secondary prevention outcomes among patients with acute myocardial infarction

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ABSTRACT

Objectives: This study aims to determine if patients with acute myocardial infarction differ in illness perception and secondary prevention outcomes depending on the treatment they received.
Methods: A repeated measures design was used to compare patients with acute myocardial infarction receiving three different treatment modalities: ST-elevation myocardial infarction treated by primary percutaneous coronary intervention, ST-elevation myocardial infarction treated by thrombolytic therapy, and non ST-elevation myocardial infarction treated by medication. A convenient sampling technique was used to recruit 206 patients with acute myocardial infarction who agreed to participate in the current study. Patients' illness perception, physical activity, and demographical and clinical data were collected during hospital admission and again at 6 months.
Results: A total of 186 patients completed the study. Results showed that the primary percutaneous coronary intervention group perceived their illness as acute rather than chronic ($P = 0.034$) and has lower personal control ($P = 0.032$), higher treatment control ($P = 0.025$), and higher perception of illness coherence ($P = 0.022$) compared with patients receiving thrombolytic therapy and treated after non-ST segment infarction. Moreover, they report low control of their blood pressure ($P = 0.013$) and less physical activity ($P = 0.001$).
Conclusion: The results of this study revealed that patients' treated with primary percutaneous coronary intervention had negative illness perception and limited behavioral changes 6 months after hospitalization in comparison with other treatment modalities such as percutaneous coronary intervention and thrombolytic treatment. Further research is recommended to confirm this association with longer follow-up study and among different cultures.

1. Introduction and background

Coronary artery disease (CAD) was the primary cause of death, accounting for approximately 37% of cardiovascular deaths and 15% of total deaths in Jordan in 2012 http://www.sciencedirect.com/science/article/pii/S2352013216301879 [1]. Myocardial infarction (MI) is the leading cause of death globally and is a worldwide health problem http://www.sciencedirect.com/science/article/pii/S2352013216301879 [2]. Both primary and secondary prevention of MI are major priorities. Diagnosis of acute myocardial infarction (AMI) is based on the type of electrocardiography changes, which are of two types: ST-segment elevation MI (STEMI) and non-ST-segment elevation MI (NSTEMI) http://www.sciencedirect.com/science/article/pii/S2352013216301879 [2].

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The management of patients with STEMI includes either sending them directly to the cardiac catheterization laboratory to re-open the occluded vessels using a procedure called primary percutaneous coronary intervention (PPCI) or emergency administration of fibrinolysis if the facility of PPCI is not available. Indeed, PPCI is considered a superior treatment for patients with STEMI when it is available within the necessary time period http://www.sciencedirect.com/science/article/pii/S2352013216301879 [3], and patients may be discharged within 48 h, leaving little time for secondary prevention to be established.

Patients with AMI who presented with NSTEMI are treated initially by medication rather than with a fibrinolytic agent. For both NSTEMI and patients with AMI treated with fibrinolytic, they frequently require coronary angiography before hospital discharge with possible percutaneous coronary intervention (PCI) by opening the occluded vessel through stent or percutaneous transluminal coronary angioplasty by opening the occluded vessel through balloon http://www.sciencedirect.com/science/article/pii/S2352013216301879 [4]. As a result, each one of the three AMI treatment modalities is exposed to different experiences during hospitalization in terms of treatment urgency and length of stay. Literature claims that this may influence patients' understanding of their diagnosis http://www.sciencedirect.com/science/article/pii/S2352013216301879 [5] and motivation for secondary prevention, and this study seeks to address this gap.

All patients with either STEMI or NSTEMI will be told that they have had a heart attack and, where appropriate, are advised to make behavioral changes http://www.sciencedirect.com/science/article/pii/S2352013216301879 [6]. However, given the very different experiences in terms of urgency of treatment initiation and hospital stay length, it is understandable that it can be difficult for all patients with an AMI diagnosis to understand this fully http://www.sciencedirect.com/science/article/pii/S2352013216301879 [5]. Research has shown that some patients who had PPCI perceived a mismatch between their expectations of treatment and recuperation and their actual experience, which led them to question the seriousness of their illness, and to consider it as acute rather than as a chronic condition http://www.sciencedirect.com/science/article/pii/S2352013216301879 [5]. Such perceptions may make it more difficult for patients to understand the chronicity of their illness and undertake the lifestyle changes necessary to prevent further disease progression http://www.sciencedirect.com/science/article/pii/S2352013216301879 [7]. Less evidence is found in terms of patients' understanding of an NSTEMI diagnosis, but qualitative data would suggest that their experience of a protracted and sometimes ambiguous diagnosis may also cause patients to question the seriousness of the event and the need for behavioral change http://www.sciencedirect.com/science/article/pii/S2352013216301879 [8].

Illness perception (IP) is the organized cognitive representation or views that patients develop to make sense of their illness experience http://www.sciencedirect.com/science/article/pii/S2352013216301879 [9]. The Self-Regulation Model (SRM) of Leventhal et al. (1984) provides a theoretical explanation of the concept of IP and the factors that influence individual's coping behavior and outcomes. The model postulates that when an individual is facing a health problem, he or she will be motivated to regulate the health-related risk consistent with his or her perception of an illness. According to the SRM, outcomes of behavioral changes are a reflection of patients' coping strategies that, in turn, are affected by their illness beliefs.

Secondary prevention is the second level of heath care that includes measures to control and limit the negative impact of an illness. Among patients diagnosed with MI, secondary prevention measures are highly recommended to avoid further disease progression and complications. These measures mainly include physical activity, smoking cessation, blood pressure and lipid management, and weight control http://www.sciencedirect.com/science/article/pii/S2352013216301879 [10].

The IP of patients with AMI has been considered a predictor of their functional status, returning to work, depressive symptoms, and attendance at cardiac rehabilitation clinics http://www.sciencedirect.com/science/article/pii/S2352013216301879 [11]. Although IPs are an important determinant of individual behavioral changes in CAD http://www.sciencedirect.com/science/article/pii/S2352013216301879 [12], sparse evidence is found regarding the implication of the fast track services of PPCI on patients' psychological and health behavior changes, and little is known about AMI patients' experiences and perceptions during and after PPCI http://www.sciencedirect.com/science/article/pii/S2352013216301879 [13]. To our knowledge, this is the first study to compare IP and associated outcomes among patients with AMI receiving different treatment modalities. This study aims to evaluate if treatment modality influences IP and the outcomes of behavioral change (obesity, smoking status, blood lipids, physical activity, and blood pressure) among patients with AMI. Hence, the present study aims to answer the following question: Do patients with AMI differ in IP and secondary prevention outcomes (SPO) depending on the treatment they received?

2. Methods

2.1. Design

A quantitative repeated-measure design was used to assess the influence of the three selected treatment modalities on IP and the outcomes of behavioral change among patients with AMI. This design was appropriate to collect and examine changes in study measures during patients' hospitalization and after 6 months.

2.2. Sample and setting

This study was conducted in the International Heart Institute in Amman. As the largest heart institute in Jordan and having patients admitted from across Jordan, we choose this institute and assume that the Jordanian population will be fairly represented. In addition, this institute is a specialized heart institute with a total of 170-bed capacity and performs cardiac surgery in addition to more than 12,000 cardiac catheterization procedures annually, including PPCI. This heart institute provides care for patients from Jordan, the region, and worldwide.

A convenience sampling technique was used to recruit the participants in the current study. The inclusion criteria were as follows: first-time AMI, over 18 years of age, physically and mentally competent, pain free and hemodynamically stable in which they have stable vital signs for more than 8 h, and agreed to participate in the study. The exclusion criteria were as follows: patients had previous MI and refused to participate in the study.

The power analysis calculation indicated that a sample of 186 patients was required, with confidence interval of 5%, 95% confidence level, and estimated number of 365 patients admitted annually to the hospital presented with first-time AMI. To account for attrition in the follow-up time, 10% was added to the calculated sample size; consequently, 206 patients were recruited to meet the target sample of 186 patients.

2.3. Data collection procedure

Approval for the study was sought and obtained from one of the Universities in the United Kingdom and from the hospital research

ethics board in Jordan. The primary researcher provided verbal and written explanations about the study. All participants' files were reviewed by the primary researcher to insure the eligibility of the participants to participate in the study. After that, the written informed consent was obtained from each participant. Then, baseline data were collected using the revised IP questionnaire and the short form of physical activity questionnaire. All patients were interviewed after they were transferred from the Intensive Cardiac Care Unit to the General Care Unit. All participants were pain free and have had stable vital signs.

The follow-up data collection took place at 6 months via a telephone interview. Patients' hospital medical records were reviewed again at this stage, which was 6 months following hospitalization. Different measures were applied to minimize potential bias; these measures include the following: data were collected from one trained researcher, standardized information was provided to all study participants, and all possible patients who were admitted to the hospital were screened for their eligibility. The time spent for each patient to complete the baseline interview ranged from 15 min to 20 min, and for the follow-up telephone interview, time spent ranged from 12 min to 15 min. The data were collected by the primary investigator for this research study.

2.4. Instrumentation

Questionnaire fo data collection consisted of three parts: demographical and clinical data, the Revised Illness Perception Questionnaire (IPQ-R), and the International Physical Activity Questionnaire (IPAQ). The medical records were examined at both the baseline and follow-up data time points to gather the required data on lipid profile results, blood pressure, height and weight, coronary angiography result, and hospital length of stay. The outcomes of secondary prevention were operationally defined in this study by BMI, lipid profiles, blood pressure, smoking behavior, and physical activity.

The second part of the questionnaire is the Revised Illness Perception Questionnaire (IPQ-R): the IPQ-R was developed by http://www.sciencedirect.com/science/article/pii/S2352013216301879 [14]. The IPQ-R sub-scales used in this study were “Timeline Acute/Chronic” (six items); “Timeline Cyclical” (four items); “Consequences” (six items); “Personal Control” (six items); “Treatment Control” (five items); “Illness Coherence” (five items), and “Emotional Representation” (six items). It contains 38 items, which were measured on a Likert scale ranging from strongly disagree (1) to strongly agree (5). Higher score of each sub-scale indicates higher perception of chronicity, cycle nature, consequences, personal control, treatment control, perception of their understanding, and emotions related to patient's illness.

Translation and backtranslation were performed and the process involved two teams of translators. The first team consisted of two nurses, both of whom held a master's degree in nursing and had clinical experience; they were also asked to independently translate the source. The two translators and the researcher then synthesized the translations to produce one version of translation. The second team consisted of two people, both of whom hold a master's degree in English language; they were also asked to independently translate back into English the translated Arabic version.

Following the back translation of the Arabic version, the translators and the researcher met as a committee to review all the translations and to compare the original version and back translation versions. As a result, a consensus was made within the team as to the appropriateness of the translation. The appropriateness of the final Arabic translated version of the instruments was tested during the pilot study: 15 participants were asked to comment on the clarity of the questions, and these participants were not included in the final sample. Patients reported that the questionnaire instruction, questions, and choices were clear. In addition, pilot testing indicated that no problems were encountered during the process of data collection, coding, and analysis. The IPQ-R has been widely used with different clinical populations with adequate reliability (Cronbach's α ranged from 0.79 to 0.89) and internal validity http://www.sciencedirect.com/science/article/pii/S2352013216301879 [14].

A confirmatory factor analysis was conducted to examine the fitting participants' responses to the IPQ-R with the latent construct of the questionnaire and examine the reliability of the questionnaire. The data collected at baseline were used to test the factor structure of IPQ-R using the MPLUS statistical package (version 6.1). Established criteria of fit statistics [Chi-square, root mean square estimate of approximate (RMSEA), and CFI] were used to examine the appropriateness of the measurement model in explaining the data.

Recommendation of the standardized RMSEA was used to indicate the overall fit between the specific model and the data set with 0.08 or below, and CFI with 0.90 or greater. If the original model measurement model was deemed not to fit the data, the following criteria of modification were introduced: items with factor loading less than 0.4 were removed. This process continued to an acceptable model and was identified to have acceptable factor loading scores. The original IPQ-R seven-structure model was tested following the fit process and was deemed to fit to data. As a result, the final model fit with the data, and 32 items represented the original seven construct of IPQ-R with RMSEA at 0.074 and CFI at 0.97.

The third part of the questionnaire is the Short Form of the IPAQ. To assess the patients' activity, the short form IPAQ-7-days-recall telephone interview version was used http://www.sciencedirect.com/science/article/pii/S2352013216301879 [15]. Following IPAQ scoring protocol, patients were categorized into three different activity levels: low, moderate, and high physical activity. The validity and reliability of the IPAQ were tested in 12 countries and showed that the short form of IPAQ has acceptable validity and reliability, with criterion validity of a median of 0.3 http://www.sciencedirect.com/science/article/pii/S2352013216301879 [15].

2.5. Ethical consideration

The ethical issues were considered carefully, given the clinical condition of the patient group. Approval for the study was sought and obtained. The ethical approval number was 10/2015. Written informed consent was obtained from all the participants who agreed to participate in the study. Confidentiality of participants was assured by offering a code number for each participant at the point of data collection and analysis. Participation was completely voluntary, and participants had the right to withdraw from the study at any time. No physical or psychological harm affected the participants because the data collection relied on noninvasive questionnaire.

2.6. Data analysis

Descriptive, inferential, and multivariate statistical methods were used to analyze the data. Descriptive statistics were used to describe the sample characteristics. Confirmatory factor analysis was used to test data fitting to the scale factors. At baseline, Chi-square, Fisher's exact test, and ANOVA were used to examine the differences between the selected treatment modalities and the study measures. Changes between the groups' baseline and follow-up time's outcome measures were analyzed using Mcnemar's test,

Wilcoxon, and repeated ANOVA. No data were missed as the researcher reviews each question after patients filled the form and encourages them to fill it without keeping any missing data.

3. Results

At baseline time point (i.e., during hospitalization), 263 patients were assessed for eligibility. However, 36 patients were not eligible (i.e., 29 were not first-time AMI and 7 were not medically stable to be part of the study) and 21 refused to participate in the study. As a result, 206 patients participated in the baseline data point. Six months later, 186 patients completed the questionnaire pack (i.e., 11 patients died, 5 were not reachable, and 4 refused to complete the follow-up data). Two-hundred and six participants completed the questionnaire at the baseline, and 186 completed the study at follow-up.

More than two-thirds of the participants were aged between 51 and 80 years old ($n = 131$, 70%). A total of 79% of the samples were male ($n = 147$), and 84% of the sample were married. Approximately half of the samples were employed and have a bachelor's degree or higher. Differences were examined between the three selected treatment modalities using Chi-square and Fisher exact test; results show no significant difference in personal demographical details, as shown in Tables 1 and 2.

Table 2 shows the examined differences between the three selected treatment modalities using Chi-square and Fisher exact test; results show significant differences in all of the clinical demographical details except the previous history of illness. Patients treated with thrombolytic therapy (THROMB) had higher rate of PCI in comparison with NSTEMI patients. In addition, results show significant differences in hospital length of stay $\chi^2(1) = 35.50$, $P = 0.001$; PPCI patients had shorter length of stay and stayed for 48 h or less as in comparison with THROMB patients and NSTEMI patients.

One-way ANOVA was performed to examine the differences in IP based on treatment modality. The results indicated that no significant difference exists across the treatment modalities in IP at baseline, as shown in Table 3. To examine the differences in change between the three treatment modalities, a repeated measure of ANOVA was performed. The results indicated that significant changes exist between the baseline and follow-up times in four of seven IP factors, i.e., timeline acute/chronic, personal control, treatment control, illness coherence.

Significant difference exist in timeline acute/chronic based on patients treatment modalities ($F = 3.43$, $P = 0.034$). Post hoc test showed that PPCI patients had significant higher perception of acuteness of their illness in comparison with both THROMB and NSTMI patients. No significant difference exists between THROMB and NSTEMI groups. In addition, significant difference is observed in mean scores of personal control ($F = 8.43$, $P = 0.032$). Post hoc test showed that PPCI patients had significant lower mean score for perception of personal control over their illness in comparison with THROMB patients. No significant difference is observed between PPCI and NSTMI and between THROMB and NSTEMI groups.

Perception of treatment control significantly differed based on patient's group ($F = 3.75$, $P = 0.025$). Post hoc test showed that PPCI patients had significant higher perception of treatment control over their illness in comparison with both THROMB and NSTMI groups. No significant difference was observed between THROMB and NSTEMI groups. Moreover, perception of illness coherence significantly differed based on patient's group($F = 4.90$, $P = 0.022$). Post hoc test showed that PPCI patients had significant higher mean score for perception of illness coherence in comparison with NSTEMI group. No significant difference is observed between PPCI and THROMB and between THROMB and NSTEMI.

In the differences across the treatment modalities for behavioral measures in the baseline time, Chi-square results indicated no significant difference based on treatment modalities, as shown in Tables 4 and 5. In addition, the changes between the baseline and follow-up time in terms of SPO, Mcnemar's test, and Wilcoxon test were used and results show no significant change in BMI and LDL. However, significant changes exist between the baseline and follow-up times in cholesterol (i.e., THROMB group had significant higher control of cholesterol), BP (i.e., PPCI had significant lower control of BP), activity level (i.e., THROMB had significant higher activity level), and smoking (i.e., each group showed lower smoking).

4. Discussion

This study aimed to examine the differences in IP and associated behavioral outcomes among patients with AMI receiving different treatment modalities. The current study showed that PPCI group perceived their illness as acute rather than chronic 6 months after hospitalization in comparison with other treatment modalities. Previous study showed that the patients' perception of their illness

Table 1
Sample characteristics: number, percent (%), and *P* value to examine the significant difference for the three selected treatment modalities.

Categories	Total No. (%)	PPCI No. (%)	THROMB No. (%)	NSTEMI No. (%)	χ^2	*P*
Age						
18–30	2 (1.1)	1 (1.5)	0	1 (1.7)	1.90	0.06
31–40	10 (5.4)	2 (3.1)	7 (10.8)	1 (1.7)		
41–50	36 (19.4)	13 (21.0)	16 (25.8)	7 (11.9)		
51–80	131 (70.4)	45 (69.2)	38 (61.3)	48 (81.4)		
81–100	7 (3.8)	4 (6.2)	1 (1.6)	2 (3.4)		
Gender						
Female	39 (21.0)	16 (24.6)	11 (17.7)	12 (20.3)	0.51	0.63
Male	147 (79.0)	49 (75.4)	51 (82.3)	47 (79.7)		
Marital status						
Single	21 (11.3)	9 (13.8)	3 (4.8)	9 (13.9)	1.20	0.08
Married	158 (84.9)	51 (78.5)	59 (95.2)	48 (81.4)		
Divorced or widowed	7 (3.8)	5 (7.7)	0	2 (3.4)		
Education level						
Secondary school or lower level	90 (48.4)	30 (45.9)	31 (50.0)	29 (49.2)	0.73	0.93
Or higher	96 (51.6)	35 (53.9)	31 (50.0)	30 (50.8)		
Employment						
Working	90 (48.4)	26 (40.0)	36 (58.1)	28 (47.5)	0.92	0.12
Not working	96 (51.6)	39 (60.0)	26 (42.0)	31 (52.5)		

Table 2
Patients' clinical demographics and P value to examine the significant difference between the three selected treatment modalities.

Categories	Total No.	PPCI	THROMB	NSTEMI	χ^2	*P*
Coronary angiography result					3.21	0.001
PPCI	65	65	0	0		
PCI	85	0	48	37		
Treated by medications only	31	0	11	20		
PTCA	3	0	2	1		
Normal Coronary	1	0	1	0		
No Angiography done	1	0	0	1		
Length of Stay					3.55	0.001
48 h or less	12	12	0	0		
49–72 h	64	41	8	15		
73–96 h	89	11	43	35		
97 h or more	21	1	11	9		
History of illness					1.11	0.220
No history	55	15	23	17		
History of illness	131	50	39	42		

Table 3
Illness perception factor result for the baseline and follow-up time(Mean ± SD).

IPQ-R factors (Illness perception)		Overall	PPCI	THROMB	NSTEMI	ANOVA (Baseline)		Repeated ANOVA	
						F	*P*	*F*	*P*
Timeline Acute/chronic	Baseline	3.0 ± 0.9	3.0 ± 0.8	3.0 ± 0.8	3.1 ± 0.9	0.68	0.957	3.43	**0.034**
	Follow-up	3.1 ± 0.8	2.7 ± 1.0	3.4 ± 0.9	3.3 ± 0.8				
Timeline cyclical	Baseline	2.8 ± 0.9	2.7 ± 1.0	2.7 ± 0.9	2.9 ± 0.8	0.91	0.370	1.12	0.084
	Follow-up	2.5 ± 1.1	2.2 ± 1.1	2.7 ± 0.9	2.7 ± 0.9				
Consequences	Baseline	3.3 ± 0.9	3.2 ± 0.9	3.2 ± 1.1	3.4 ± 1.0	0.88	0.588	0.98	0.150
	Follow-up	3.1 ± 0.8	2.8 ± 0.8	3.6 ± 1.0	3.2 ± 0.8				
Personal control	Baseline	3.0 ± 0.9	3.1 ± 1.0	3.0 ± 0.9	3.0 ± 1.0	0.98	0.557	8.43	**0.032**
	Follow-up	3.0 ± 1.0	2.6 ± 0.8	3.2 ± 1.1	3.1 ± 0.9				
Treatment control	Baseline	3.7 ± 0.8	3.7 ± 0.9	3.7 ± 1.0	3.7 ± 1.1	0.81	0.863	3.75	**0.025**
	Follow-up	4.0 ± 1.1	4.3 ± 0.9	3.8 ± 0.9	3.8 ± 0.8				
Illness coherence	Baseline	4.1 ± 0.9	4.0 ± 0.8	4.2 ± 0.8	4.2 ± 0.9	0.98	0.339	4.90	**0.022**
	Follow-up	4.2 ± 1.0	4.3 ± 1.1	4.2 ± 0.9	4.0 ± 1.0				
Emotional representation	Baseline	2.6 ± 0.9	2.5 ± 1.0	2.5 ± 0.8	2.6 ± 1.1	0.63	0.808	1.34	0.074
	Follow-up	2.2 ± 0.8	2.0 ± 0.9	2.4 ± 0.8	2.3 ± 0.9				

trajectory as acute or chronic affects their motivation for behavioral changes, including taking secondary prevention measures. Evidence has suggested that patients with CAD who perceive their illness as chronic were more confident in making changes to their behavior in comparison with those who perceived their illness as being acute http://www.sciencedirect.com/science/article/pii/S2352013216301879 [12]. Such perception of chronicity of illness may limit behavioral changes shown in this study as blood lipids and physical activity.

Moreover, result indicates that PPCI group had lower personal control and higher treatment control over their illness in comparison with the THROMB and NSTEMI groups. Previous studies showed inconsistent findings with regard to the effect of perception of control over the illness has an effect on patients' behavioral changes. A greater perception of higher control over the illness among patients with AMI has led them to be highly motivated to change their behavior http://www.sciencedirect.com/science/article/pii/S2352013216301879 [16]. However, another study reported that patients who felt that they had a high degree of control over their illness were less likely to show motivation for behavioral changes http://www.sciencedirect.com/science/article/pii/S2352013216301879 [17]. Indeed, these studies measure control as one factor rather than two distinct factors: personal and treatment control, which were measured in the current study that may affect the generalizability of their results. Lower perception of personal control and higher treatment control over PPCI group may limit their behavioral changes, as shown in the current study.

Patients who had PPCI in the current study were found to have higher perception of illness coherence; this refers to their perception of understanding their illness 6 months after hospitalization. An earlier study found that patients with AMI who had a good understanding of their illness were more likely to change their health-related behavior http://www.sciencedirect.com/science/article/pii/S2352013216301879 [18]. In this study, the PPCI group did not report higher motivation or behavioral changes after the illness compared with those from other treatment modalities. This might be due to the fact that patients who had PPCI report fewer symptoms than patients in other groups; while they may believe that they understand their illness, in actuality they do not.

The majority of the patients in this study had one or more previous illnesses, including CAD risk factors. This result is consistent with previous studies conducted in Jordan http://www.sciencedirect.com/science/article/pii/S2352013216301879 [19]. Patients in the current study have higher rates of smoking and lower HTN and dyslipidemia in comparison with patients in other countries, such as those in Europe http://www.sciencedirect.com/science/article/pii/S2352013216301879 [20]. The primary and secondary prevention strategies to prevent development and recurrence of the cardiac diseases in Jordan are limited http://www.sciencedirect.com/science/article/pii/S2352013216301879 [21], and this might explain the higher rates of smoking among the current study patients. With the presence of higher risk factors among patients with AMI, as shown in this study, greater effort is needed to minimize this risk by providing secondary prevention strategies.

Table 4
Outcomes of secondary prevention in baseline and follow-up time (n).

Factors		Total No.	PPCI	THROMB	NSTEMI	Baseline		Mcnemar's test	
						χ^2	P	Z	P
BMI						0.86	0.474	1.34	0.219
Controlled	Baseline	63	19	24	20				
	Follow-up	67	20	27	20				
Not controlled	Baseline	114	44	35	35				
	Follow-up	110	43	32	35				
LDL						1.23	0.087	1.45	0.064
Controlled	Baseline	47	12	19	16				
	Follow-up	56	15	24	17				
Not controlled	Baseline	83	36	21	26				
	Follow-up	74	33	16	25				
Cholesterol						0.76	0.249	2.45 (THROMB group)	**0.02**
Controlled	Baseline	39	11	16	12				
	Follow-up	58	17	24	17				
Not controlled	Baseline	96	38	26	32				
	Follow-up	77	32	18	27				
BP						0.78	0.368	3.56 (PPCI group)	**0.013**
Controlled	Baseline	146	55	48	43				
	Follow-up	145	45	53	47				
Not controlled	Baseline	29	7	11	11				
	Follow-up	30	17	6	7				
Smoking						0.77	0.626	3.46	0.001
Non smoker	Baseline	77	27	23	27				
	Follow-up	109	36	38	35				
Smoker	Baseline	109	38	39	32				
	Follow-up	77	29	24	24				

Table 5
Physical activity results for both baseline and follow-up time.

Activity Level Categories	Baseline				Follow-up			
	Total No.	PPCI	THROMB	NSTEMI	Total No.	PPCI	THROMB	NSTEMI
Low	138	46	49	43	124	50	33	41
Moderate	40	18	9	13	49	14	22	13
High	8	1	4	3	13	1	7	5

Note: Chi-square for baseline, $P = 0.45$; Wilcoxon test for the change, $P = 0.001$.

The outcomes of behavioral changes between the baseline and follow-up time among the patients with AMI were limited except for smoking status. Previous studies on secondary prevention among AMI patients, though limited, were consistent with this result. A previous study conducted in Jordan found that 29.7% of patients with CAD stopped smoking after the illness, and the main motivator was physicians' advice http://www.sciencedirect.com/science/article/pii/S2352013216301879 [22]. Previous studies have shown the effectiveness of cardiac rehabilitation programs (CRP) in increasing behavioral changes after cardiac events and in improving patients' outcomes http://www.sciencedirect.com/science/article/pii/S2352013216301879 [23]. Unfortunately, Jordan lacks CRP, and this might limit the behavioral changes of patients with AMI in the current study.

The clinical demographical details showed some differences between the three treatment modalities. Previous studies show that patients who had PPCI had a shorter length of hospital stay http://www.sciencedirect.com/science/article/pii/S2352013216301879 [13]. The PPCI group's hospital stay is short length, which may limit the ability of patients who had PPCI to recall the information given by health care team during hospitalization http://www.sciencedirect.com/science/article/pii/S2352013216301879 [24]. This may increase the importance of follow-up visits with these patients to ensure that they understand the information that is given to them and to ensure the appropriate understanding of the nature of their illness and behavioral changes.

The findings of this study should be received cautiously, given that it has a number of limitations. First, the study was conducted in Jordan where formal CRP is not found; other countries where patients with AMI have access to CRP might have greater understanding of the nature of their illness and the ways to change their behavior. Second, a longer follow-up time might have revealed further changes in patients' IP and behavior. A previous study showed that patients with AMI had increased their coping and experience of illness over time http://www.sciencedirect.com/science/article/pii/S2352013216301879 [25]. Third, the convenient sample and the study being conducted in one cardiac center will limit the generalizability of the study findings among Jordanian population.

5. Implication for practice

Previous studies have shown the importance of CRP after AMI http://www.sciencedirect.com/science/article/pii/S2352013216301879 [23]. Patients with AMI in Jordan do not have access to CRP. Cardiac rehabilitation has increased patients' knowledge about the nature of their illness and increase their motivation for behavioral changes http://www.sciencedirect.com/science/article/pii/S2352013216301879 [21]. The study findings showed the importance of assessing patients' understanding or IP after AMI, particularly patients treated with PPCI to insure appropriate understanding of their illness and to increase their

motivation for behavioral changes http://www.sciencedirect.com/science/article/pii/S2352013216301879 [18,26]. Health care providers, such as nurses, play an important role in assessing patients' IP, initially during hospitalization and later at the follow-up outpatient clinic.

6. Conclusion and recommendations

The results of this study revealed that patients treated with PPCI had negative IP, such as perception of acuteness of their illness, lower personal control, and limited behavioral changes 6 months after hospitalization in comparison with other treatment modalities. These differences showed in the current study, particularly among the PPCI group, should be taken in consideration, as it may impact on their behavioral changes. Educators, including nurses, have a significant role in assessing and educating PPCI to ensure appropriate understanding of their illness. Further research is recommended to explore the differences in IP and behavioral changes among different AMI groups with longer follow-up. A larger, heterogeneous randomized selected sample of patients with AMI can be used in future studies to improve generalizability of the study findings among Jordanian population. Furthermore, the authors of this study highly recommend further qualitative study that aims to explore IPs and the associated SPO among patients diagnosed with MI.

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